ENCYCLOPÆDIA BRITANNICA;

OR, A

DICTIONARY

OF

ARTS, SCIENCES, &c.

On a PLAN entirely NEW:

BY WHICH,

THE DIFFERENT SCIENCES AND ARTS
Are digeſted into the FORM of Diſtinct
TREATISES OR SYSTEMS,
COMPREHENDING
The HISTORY, THEORY, and PRACTICE, of each,
according to the Lateſt Diſcoveries and Improvements;
AND FULL EXPLANATIONS ARE GIVEN OF THE
VARIOUS DETACHED PARTS OF KNOWLEDGE,
WHETHER RELATING TO
NATURAL and ARTIFICIAL Objects, or to Matters ECCLESIASTICAL,
CIVIL, MILITARY, COMMERCIAL, *&c.*
TOGETHER WITH
A DESCRIPTION of all the Countries, Cities, principal Mountains, Seas, Rivers, *&c.*
throughout the WORLD;
A General HISTORY, *Ancient* and *Modern*, of the different Empires, Kingdoms, and States;
AND
An Account of the LIVES of the moſt Eminent Perſons in every Nation,
from the earlieſt ages down to the preſent times.

THE WHOLE COMPILED FROM
THE WRITINGS OF THE BEST AUTHORS, IN SEVERAL LANGUAGES; THE MOST APPROVED DICTIONARIES,
AS WELL OF GENERAL SCIENCE AS OF PARTICULAR BRANCHES; THE TRANSACTIONS, JOURNALS, AND MEMOIRS, OF LEARNED
SOCIETIES, BOTH AT HOME AND ABROAD; THE MS. LECTURES OF EMINENT PROFESSORS ON DIFFERENT SCIENCES;
AND A VARIETY OF ORIGINAL MATERIALS, FURNISHED BY AN EXTENSIVE CORRESPONDENCE.

The SECOND EDITION; greatly Improved and Enlarged.

ILLUSTRATED WITH NEAR THREE HUNDRED COPPERPLATES.

VOL. VIII.

INDOCTI DISCANT, ET AMENT MEMINISSE PERITI.

EDINBURGH:
Printed for J. BALFOUR and Co. W. GORDON, J. BELL, J. DICKSON, C. ELLIOT, W. CREECH,
J. McCLIESH, A. BELL, J. HUTTON, and C. MACFARQUHAR.
MDCCLXXXI.

1075/8

BRITISH MUSEUM

A NEW

Dictionary of Arts, Sciences, &c.

OPTICS. Part III.

Of the Rainbow.

Sect. I. *The Application of the foregoing Theory to ſeveral natural Phenomena.*

§ 1. *Of the Rainbow.*

THIS beautiful phenomenon hath engaged the attention of all ages. By ſome nations it hath been deified; though the more ſenſible part always looked upon it as a natural appearance, and endeavoured, however imperfectly, to account for it. The obſervations of the ancients and philoſophers of the middle ages concerning the rainbow were ſuch as could not have eſcaped the notice of the moſt illiterate huſbandmen who gazed at the ſky; and their hypotheſes were ſuch as deſerve no notice. It was a conſiderable time even after the dawn of true philoſophy in this weſtern part of the world, before we find any diſcovery of importance on this ſubject. Maurolycus was the firſt who pretended to have meaſured the diameters of the two rainbows with much exactneſs; and he reports, that he found that of the inner bow to be 45 degrees, and that of the outer bow 56; from which Des Cartes takes occaſion to obſerve, how little we can depend upon the obſervations of thoſe who were not acquainted with the cauſes of appearances.

One *Clichtovæus* (the ſame, it is probable, who diſtinguiſhed himſelf by his oppoſition to Luther, and who died in 1543) had maintained, that the ſecond bow is the image of the firſt, as he thought was evident from the inverted order of the colours. For, ſaid he, when we look into the water, all the images that we ſee reflected by it are inverted with reſpect to the objects themſelves; the tops of the trees, for inſtance, that ſtand near the brink, appearing lower than the roots.

That the rainbow is oppoſite to the ſun, had always been obſerved. It was, therefore, natural to imagine, that the colours of it were produced by ſome kind of reflection of the rays of light from drops of rain, or vapour. The regular order of the colours was another circumſtance that could not have eſcaped the notice of any perſon. But, notwithſtanding mere reflection had in no other caſe been obſerved to produce colours, and it could not but have been obſerved that refraction is frequently attended with that phenomenon, yet no perſon ſeems to have thought of having recourſe to a proper refraction in this caſe, before one *Fletcher* of Breſlau, who, in a treatiſe which he publiſhed in 1571, endeavoured to account for the colours of the rainbow by means of a double refraction and one reflection. But he imagined that a ray of light, after entering a drop of rain, and ſuffering a refraction both at its entrance and exit, was afterwards reflected from another drop, before it reached the eye of the ſpectator. He ſeems to have overlooked the reflection at the farther ſide of the drop, or to have imagined that all the bendings of the light within the drop would not make a ſufficient curvature to bring the ray of the ſun to the eye of the ſpectator. That he ſhould think of two refractions, was the neceſſary conſequence of his ſuppoſing that the ray entered the drop at all. This ſuppoſition, therefore, was all the light that he threw upon the ſubject. B. Porta ſuppoſed that the rainbow is produced by the refraction of light in the whole body of rain or vapour, but not in the ſeparate drops.

Of the Rainbow.

After all, it was a man whom no writers allow to have had any pretenſions to philoſophy, that hit upon this curious diſcovery. This was Antonio De Dominis, biſhop of Spalatro, whoſe treatiſe *De Radiis Viſus et Lucis*, was publiſhed by J. Bartolus in 1611. He firſt advanced, that the double refraction of Fletcher, with an intervening reflection, was ſufficient to produce the colours of the bow, and alſo to bring the rays that formed them to the eye of the ſpectator, without any ſubſequent reflection. He diſtinctly deſcribes the progreſs of a ray of light entering the upper part of the drop, where it ſuffers one refraction, and after being thereby thrown upon the back part of the inner ſurface, is from thence reflected to the lower part of the drop; at which place undergoing a ſecond refraction, it is thereby bent, ſo as to come directly to the eye. To verify this hypotheſis, this perſon (no philoſopher as he was) proceeded in a very ſenſible and philoſophical manner. For he procured a ſmall globe of ſolid glaſs, and viewing it when it was expoſed to the rays of the ſun, in the ſame manner in which he had ſuppoſed that the drops of rain were ſituated with reſpect to them, he actually obſerved the ſame colours which he had ſeen in the true rainbow, and in the ſame order.

Thus the circumſtances in which the colours of the rainbow were formed, and the progreſs of a ray of light through a drop of water, were clearly underſtood; but philoſophers were a long time at a loſs when they endeavoured to aſſign reaſons for all the particular colours, and for the order of them. Indeed nothing but the doctrine of the different refrangibility of the rays of light, which was a diſcovery reſerved for the great Sir Iſaac Newton, could furniſh a complete ſolution of this difficulty. De Dominis ſuppoſed that the red rays were thoſe which had traverſed the leaſt ſpace in the inſide of a drop of water, and therefore retained more of their native force, and conſequently, ſtriking the eye more briſkly, gave it a ſtronger ſenſation; that the green and blue colours were produced by thoſe rays, the force of which had been, in ſome meaſure, obtunded in paſſing through a greater body of water; and that all the intermediate colours were compoſed (according to the hypotheſis which generally prevailed at that time) of a mixture of theſe three primary ones. That the different colours were cauſed by ſome difference in the impulſe of light upon the eye, and the greater or leſs impreſſion that was thereby made upon it, was an opinion which had been adopted by many perſons, who had ventured to depart from the authority of Ariſtotle.

Afterwards the ſame De Dominis obſerved, that all the rays of the ſame colour muſt leave the drop of water in a part ſimilarly ſituated with reſpect to the eye, in order that each of the colours may appear in a circle, the centre of which is a point of the heavens, in a line drawn from the ſun through the eye of the ſpectator. The red rays, he obſerved, muſt iſſue from the drop neareſt to the bottom of it, in order that the circle of red may be the outermoſt, and therefore the moſt elevated in the bow.

Notwithſtanding De Dominis conceived ſo juſtly of the manner in which the inner rainbow is formed, he was far from having as juſt an idea of the cauſe of the exterior bow. This he endeavoured to explain in the very ſame manner in which he had done the interior, viz. by one reflection of the light within the drop, preceded and followed by a refraction; ſuppoſing only that the rays which formed the exterior bow, were returned to the eye by a part of the drop lower than that which tranſmitted the red of the interior bow. He alſo ſuppoſed that the rays which formed one of the bows came from the ſuperior part of the ſun's diſk, and thoſe which formed the other from the inferior part of it. He did not conſider, that upon thoſe principles, the two bows ought to have been contiguous; or rather, that an indefinite number of bows would have had their colours all intermixed; which would have been no bow at all.

When Sir Iſaac Newton diſcovered the different refrangibility of the rays of light, he immediately applied his new theory of light and colours to the phenomena of the rainbow, taking this remarkable object of philoſophical inquiry where De Dominis and Deſcartes, for want of this knowledge, were obliged to leave their inveſtigations imperfect. For they could give no good reaſon why the bow ſhould be coloured, and much leſs could they give any ſatisfactory account of the order in which the colours appear.

If different particles of light had not different degrees of refrangibility, on which the colours depend, the rainbow, beſides being much narrower than it is, would be colourleſs; but the different refrangibility of differently coloured rays being admitted, the reaſon is obvious, both why the bow ſhould be coloured, and alſo why the colours ſhould appear in the order in which they are obſerved. Let A, (fig. 2.) be a drop of water, and S a pencil of light; which, on its leaving the drop of water, reaches the eye of the ſpectator. This ray, at its entrance into the drop, begins to be decompoſed into its proper colours; and upon leaving the drop, after one reflection and a ſecond refraction, it is farther decompoſed into as many ſmall differently-coloured pencils, as there are primitive colours in the light. Three of them only are drawn in this figure, of which the blue is the moſt, and the red the leaſt refracted.

Plate CCXIV.

The doctrine of the different refrangibility of light enables us to give a reaſon for the ſize of a bow of each particular colour. Newton, having found that the ſines of refraction of the moſt refrangible and leaſt refrangible rays, in paſſing from rain-water into air, are in the proportion of 185 to 182, when the ſine of incidence is 138, calculated the ſize of the bow; and he found, that if the ſun was only a phyſical point, without ſenſible magnitude, the breadth of the inner bow would be 2 degrees; and if to this 30′ was added, for the apparent diameter of the ſun, the whole breadth would be 2¼ degrees. But as the outermoſt colours, eſpecially the violet, are extremely faint, the breadth of the bow will not, in reality, appear to exceed two degrees. He finds, by the ſame principles, that the breadth of the exterior bow, if it was every where equally vivid, would be 4° 20′. But in this caſe there is a greater deduction to be made, on account of the faintneſs of the light of the exterior bow; ſo that, in fact, it will not appear to be more than 3 degrees broad.

The principal phenomena of the rainbow are all explained on Sir Iſaac Newton's principles in the following propoſitions.

When the rays of the ſun fall upon a drop of rain and enter into it, ſome of them, after one reflection and two refractions, may come to the eye of a ſpectator who has his back towards the ſun and his face toward the drop.

Plate CCXIII.

If XY (fig. 6) is a drop of rain, and the ſun ſhines upon it in any lines *ſf*, *ſd*, *ſa*, &c. moſt of the rays will enter into the drop; ſome few of them only will be reflected from the firſt ſurface; thoſe rays, which are reflected from thence, do not come under our preſent conſideration, becauſe they are never refracted at all. The greateſt part of the rays then enter the drop, and thoſe paſſing on to the ſecond ſurface, will moſt of them be tranſmitted through the drop; but neither do thoſe rays which are thus tranſmitted fall under our preſent conſideration, ſince they are not reflected. For the rays, which are deſcribed in the propoſition, are ſuch as are twice refracted and once reflected. However, at the ſecond ſurface, or hinder part of the drop, at *pg*, ſome few rays will be re-

3 MA 53

OPTICS.

Plate CCXIII.

Fig. 1.

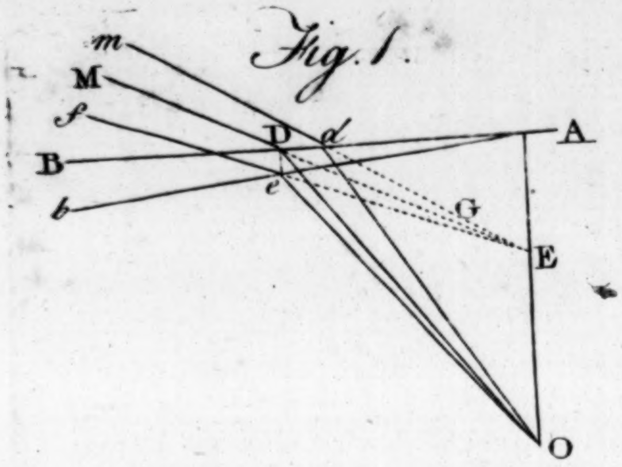

m
M
f
B
b
D
d
e
A
G
E
O

Fig. 2.

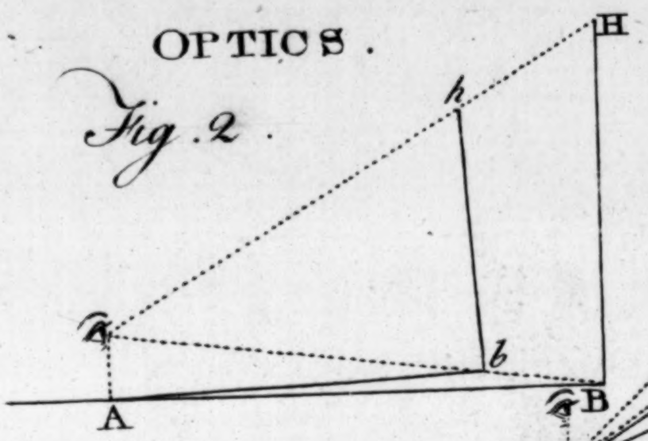


Fig. 3.

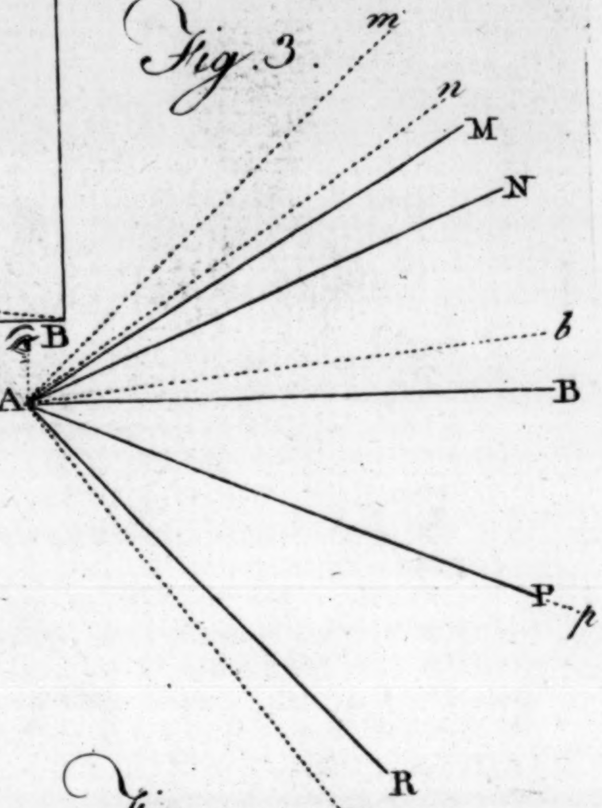

m
n
M
N
b
B
A
P
p
R
r

Fig. 4.

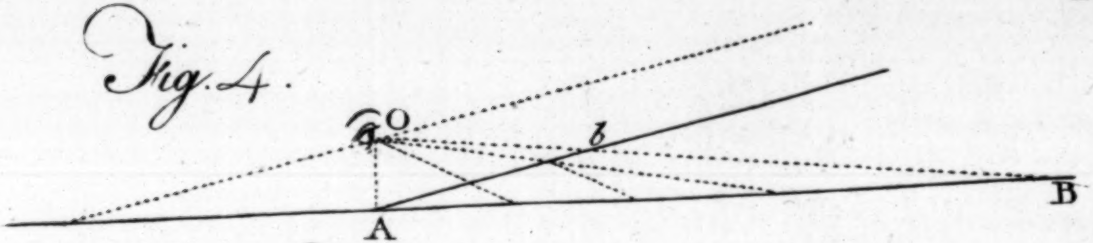


Fig. 5.

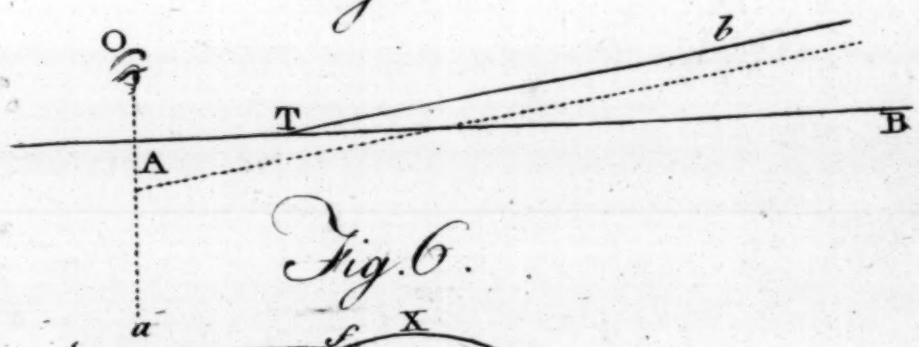


Fig. 6.

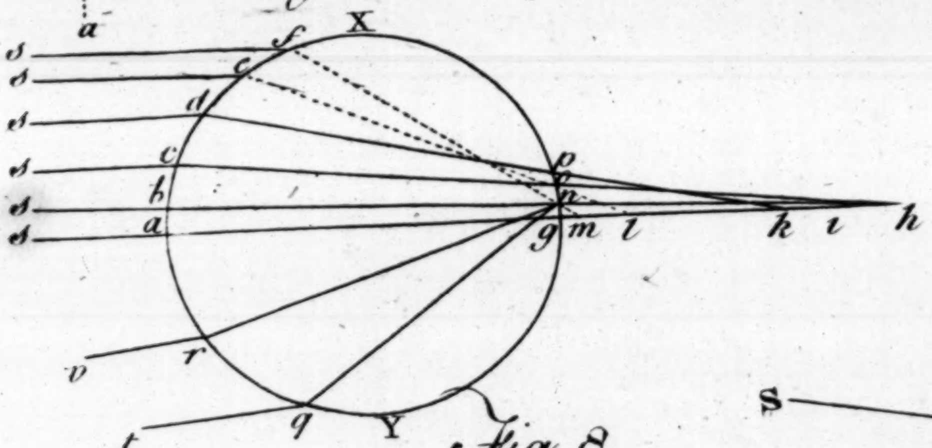

s
s
s
s
s
s
f
X
e
d
c
b
a
o
n
g
m
l
k
i
h
v
r
t
q
Y

Fig. 7.

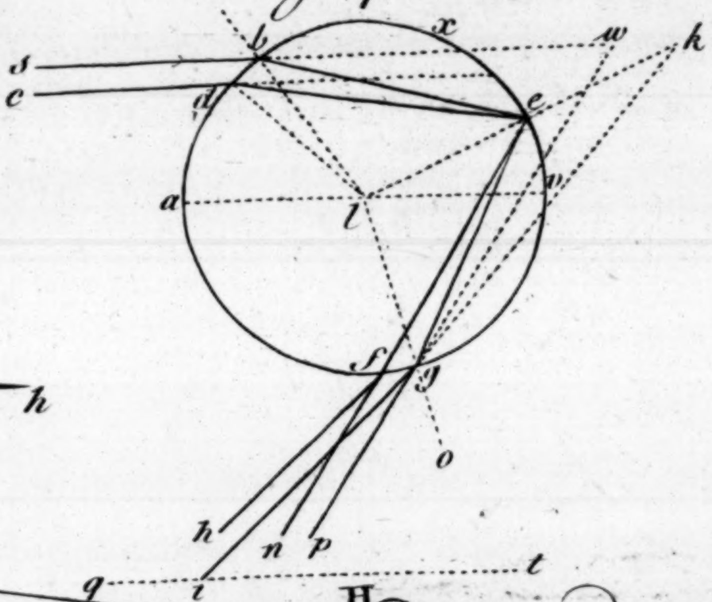

s
c
b
x
w
k
d
e
a
l
m
f
g
o
h
n
p
q
i
t

Fig. 8.

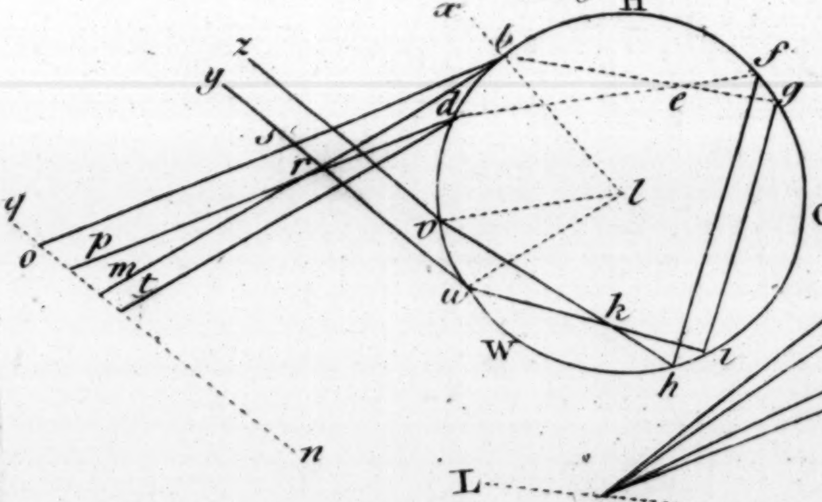
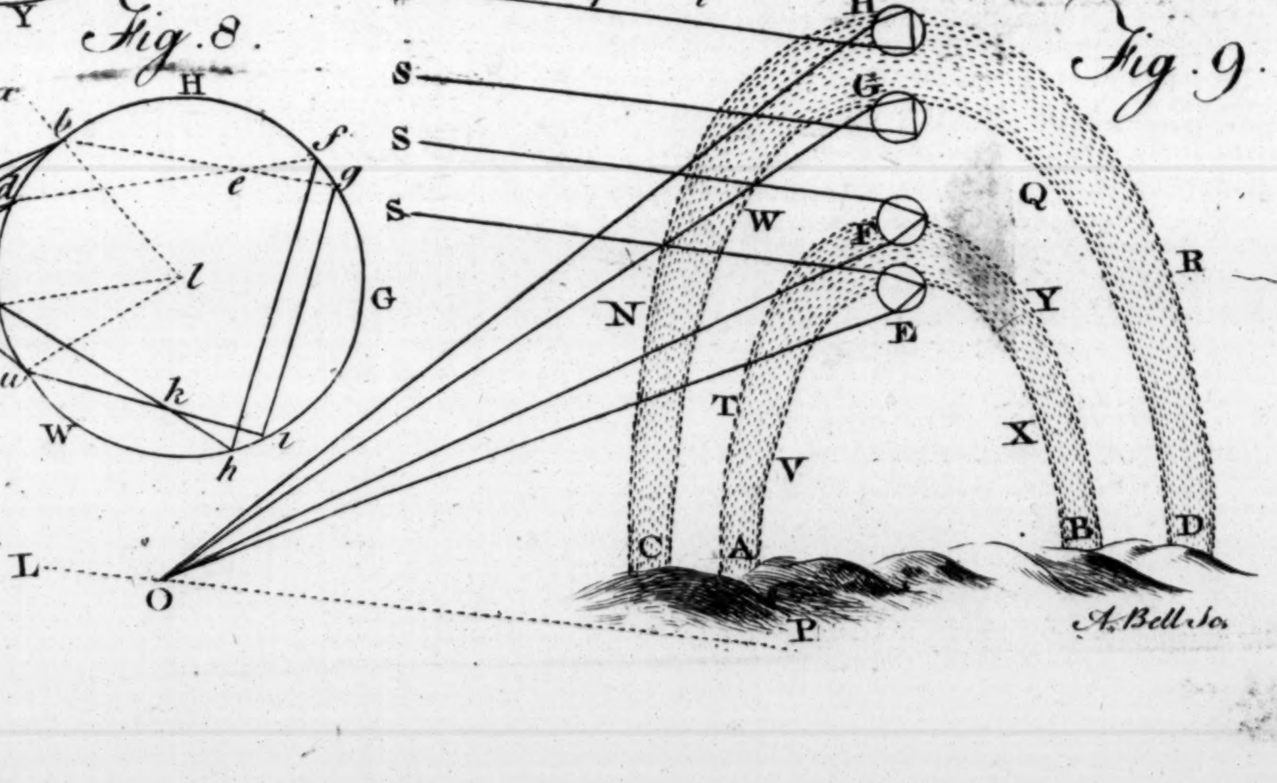

x
H
z
y
b
f
g
d
e
s
r
q
o
p
m
t
l
v
G
u
k
W
h
i
n

Fig. 9.


S
S
S
S
H
G
W
Q
F
R
N
Y
E
T
X
V
C
A
B
D
L
O
P

A. Bell Sc.

reflected, whilſt the rays are tranſmitted: thoſe rays proceed in ſome ſuch lines as nr, nq; and coming out of the drop in the lines rv, qt, may fall upon the eye of a ſpectator, who is placed any where in thoſe lines, with his face towards the drop, and conſequently with his back towards the ſun, which is ſuppoſed to ſhine upon the drop in the lines sf, sd, sa, &c. Theſe rays are twice refracted, and once reflected: they are refracted when they paſs out of the air into the drop; they are reflected from the ſecond ſurface, and are refracted again when they paſs out of the drop into the air.

When rays of light reflected from a drop of rain come to the eye, thoſe are called effectual which are able to excite a ſenſation.

When rays of light come out of a drop of rain, they will not be effectual, unleſs they are parallel and contiguous.

There are but few rays that can come to the eye at all: for the greateſt part of thoſe rays which enter the drop XY (fig. 6.) between X and a, paſs out of the drop thro' the hinder ſurface pg; only few are reflected from thence, and come out through the nearer ſurface between a and y. Now, ſuch rays as emerge, or come out of the drop, between a and Y, will be ineffectual, unleſs they are parallel to one another, as rv and qt are; becauſe ſuch rays as come out diverging from one another, will be ſo far aſunder when they come to the eye, that all of them cannot enter the pupil; and the very few that can enter it will not be ſufficient to excite any ſenſation. But even rays, which are parallel, as rv, qt, will not be effectual, unleſs there are ſeveral of them contiguous or very near to one another. The two rays rv and qt alone will not be perceived, though both of them enter the eye; for ſo very few rays are not ſufficient to excite a ſenſation.

When rays of light come out of a drop of rain after one reflection, thoſe will be effectual which are reflected from the ſame point, and which entered the drop near to one another.

Any rays, as sb and cd, (fig. 7.) when they have paſſed out of the air into a drop of water, will be refracted towards the perpendiculars bl, dl; and as the ray sb falls farther from the axis av than the ray cd, sb will be more refracted than cd; ſo that theſe rays, though parallel to one another at their incidence, may deſcribe the lines be and de after refraction, and be both of them reflected from one and the ſame point e. Now all rays which are thus reflected from one and the ſame point, when they have deſcribed the lines ef, eg, and after reflection emerge at f and g, will be ſo refracted, when they paſs out of the drop into the air, as to deſcribe the lines fh, gi, parallel to one another. If theſe rays were to return from e in the lines eb, ed, and were to emerge at b and d, they would be refracted into the lines of their incidence bs, dc. But if theſe rays, inſtead of being returned in the lines eb, ed, are reflected from the ſame point e in the lines eg, ef, the lines of reflection eg and ef will be inclined both to one another, and to the ſurface of the drop: juſt as much as the lines eb and ed are. Firſt eb and eg make juſt the ſame angle with the ſurface of the drop: for the angle bex, which eb makes with the ſurface of the drop, is the complement of incidence, and the angle gey, which eg makes with the ſurface, is the complement of reflection; and theſe two are equal to one another. In the ſame manner we might prove, that ed and ef make equal angles with the ſurface of the drop. Secondly, The angle bed is equal to the angle feg; or the reflected rays eg, ef, and the incident rays be, de, are equally inclined to each other. For the angle of incidence bel is equal to the angle of reflection gel, and the angle of incidence del is equal to the angle of reflection fel; conſequently the difference between the angles of incidence is equal to the difference between the angles of reflection, or $bel-del=gel-fel$, or $bed=gef$.—Since therefore either the lines eg, ef, or the lines eb, ed, are equally inclined both to one another and to the ſurface of the drop; the rays will be refracted in the ſame manner, whether they were to return in the lines eb, ed, or are reflected in the lines eg, ef. But if they were to return in the lines eb, ed, the refraction, when they emerge at b and d, would make them parallel. Therefore, if they are reflected from one and the ſame point e in the lines eg, ef, the refraction, when they emerge at g and f, will likewiſe make them parallel.

But though ſuch rays as are reflected from the ſame point in the hinder part of a drop of rain, are parallel to one another when they emerge, and ſo have one condition that is requiſite towards making them effectual, yet there is another condition neceſſary; for rays, that are effectual, muſt be contiguous, as well as parallel. And though rays, which enter the drop in different places, may be parallel when they emerge, thoſe only will be contiguous which enter it nearly at the ſame place.

Let XY, (fig. 6.) be a drop of rain, ag the axis or diameter of the drop, and sa a ray of light that comes from the ſun and enters the drop at the point a. This ray sa, becauſe it is perpendicular to both the ſurfaces, will paſs ſtraight through the drop in the line agh without being refracted; but any collateral rays that fall about sb, as they paſs through the drop, will be made to converge to their axis, and paſſing out at n will meet the axis at h: rays which fall farther from the axis than sb, ſuch as thoſe which fall about sc, will likewiſe be made to converge; but then their focus will be nearer to the drop than h. Suppoſe therefore i to be the focus to which the rays that fall about sc will converge, any ray sc, when it has deſcribed the line co within the drop, and is tending to the focus i, will paſs out of the drop at the point o. The rays that fall upon the drop about sd, more remote ſtill from the axis, will converge to a focus ſtill nearer than i, as ſuppoſe at k. Theſe rays therefore go out of the drop at p. The rays, that fall ſtill more remote from the axis, as se, will converge to a focus nearer than k, as ſuppoſe at l; and the ray se, when it has deſcribed the line eo within the drop, and is tending to l, will paſs out at the point o. The rays, that fall ſtill more remote from the axis, will converge to a focus ſtill nearer. Thus the ray sf will after refraction converge to a focus at m, which is nearer than l; and having deſcribed the line fn within the drop, it will paſs out at the point n. Now here we may obſerve, that as any rays sb or sc, fall farther above the axis sa, the points n, or o, where they paſs out behind the drop, will be farther above g; or that, as the incident ray riſes from the axis sa, the arc gno increaſes, till we come to ſome ray sd, which paſſes out of the drop at p: and this is the higheſt point where any ray that falls upon the quadrant or quarter ax can paſs out: for any rays se, or sf, that fall higher than sd, will not paſs out in any point above p, but at the points o or n, which are below it. Conſequently, tho' the arc $gnop$ increaſes, whilſt the diſtance of the incident ray from the axis sa increaſed, till we come to the ray sd; yet afterwards, the higher the ray falls above the axis sa, this arc $pong$ will decreaſe.

We have hitherto ſpoken of the points on the hinder part of the drop, where the rays paſs out of it; but this was for the ſake of determining the points from whence thoſe rays are reflected, which do not paſs out behind the drop. For, in explaining the rainbow, we have no farther reaſon to conſider thoſe rays which go through the drop; ſince they can never come to the eye of a ſpectator placed any where in the lines rv or qt with his face towards the drop. Now, as there are many rays which paſs out of the drop between g and p, ſo ſome few rays will be reflected from thence; and conſequently the ſeveral points between g and p, which are the points where ſome of the rays paſs out of the drop, are likewiſe the points of reflection for the reſt which do not paſs out. Therefore, in reſpect of thoſe rays which are reflected, we may call gp the arc of reflection; and many ſay, that this arc of reflection increaſes, as the diſtance of the incident ray from the axis sa increaſes, till we come to the ray sd; the arc of reflection is gn for the ray sb, it is go for the ray sc, and gp for the ray sd. But after this, as the diſtance of the incident ray from the axis sa increaſes, the arc of reflection decreaſes; for og leſs than pg is the arc of reflection for the ray se, and ng is the arc of reflection for the ray sf.

From hence it is obvious, that ſome one ray, which falls above sd, may be reflected from the ſame point with ſome other ray which falls below sd. Thus, for inſtance, the ray sb will be reflected from the point n, and the ray sf will be reflected from the ſame point; and conſequently, when the reflected rays nr, nq, are refracted as they paſs out of the drop at r and q, they will be parallel, by what has been ſhewn in the former part of this propoſition. But ſince the intermediate rays, which enter the drop between sf and sb, are not reflected from the ſame point n, theſe two rays alone will be the parallel to one another when they come out of the drop, and the intermediate rays will not be parallel to them. And conſequently theſe rays rv, qt, though they are parallel after they emerge at r and q, will not be contiguous, and for that reaſon will not be effectual; the ray sd is reflected from p, which has been ſhewn to be the limit of the arc of reflection; ſuch rays as fall juſt above sd, and juſt below sd, will be reflected from nearly the ſame point p, as appears from what has been already ſhewn. Theſe rays therefore will be parallel, becauſe they are reflected from the ſame point p: and they will likewiſe be contiguous, becauſe they all of them enter the drop at one and the ſame place very near to d. Conſequently, ſuch rays as enter the drop at d, and are reflected from p the limit of the arc of reflection, will be effectual; ſince, when they emerge at the fore part of the drop between a and y, they will be both parallel and contiguous.

If we can make out hereafter that the rainbow is produced by the rays of the ſun which are thus reflected from drops of rain as they fall whilſt the ſun ſhines upon them, this propoſition may ſerve to ſhew us, that this appearance is not produced by any rays that fall upon any part, and are reflected from any part of thoſe drops: ſince this appearance cannot be produced by any rays but thoſe which are effectual; and effectual rays muſt always enter each drop at one certain place in the fore-part of it, and muſt likewiſe be reflected from one certain place in the hinder ſurface.

When rays that are effectual emerge from a drop of rain after one reflection and two refractions, thoſe which are moſt refrangible, will, at their emerſion, make a leſs angle with the incident rays than thoſe do which are leaſt refrangible; and by this means the rays of different colours will be ſeparated from one another.

Plate CCXIII.

Let fh and gi, (fig. 7.) be effectual violet rays emerging from the drop at fg; and fn, gp, effectual red rays emerging from the ſame drop at the ſame place. Now, though all the violet rays are parallel to one another, becauſe they are ſuppoſed effectual, and though all the red rays are likewiſe parallel to one another for the ſame reaſon; yet the violet rays will not be parallel to the red rays. Theſe rays, as they have different colours, and different degrees of refrangibility, will diverge from one another; any violent ray gi, which emerges at g, will diverge from any red ray gp, which emerges at the ſame place. Now, both the violet ray gi, and the red ray gp, as they paſs out of the drop of water into the air, will be refracted from the perpendicular lo. But the violet ray is more refrangible than the red one; and for that reaſon gi, or the refracted violet ray, will make a greater angle with the perpendicular than gp the refracted red ray; or the angle igo will be greater than the angle pgo. Suppoſe the incident ray sb to be continued in the direction sk, and the violet ray ig to be continued backward in the direction ik, till it meets the incident ray at k. Suppoſe likewiſe the red ray pg to be continued backwards in the ſame manner, till it meets the incident ray at w. The angle iks is that which the violet ray, or moſt refrangible ray at its emerſion, makes with the incident ray; and the angle pws is that which the red ray, or leaſt refrangible ray at its emerſion, makes with the incident ray. The angle iks is leſs than the angle pws. For, in the triangle, gwk, gws, or pws, is the external angle at the baſe, and gkw or iks is one of the internal oppoſite angles; and either internal oppoſite angle is leſs than the external angle at the baſe. (Euc. b. I. prop. 16.) What has been ſhewn to be true of the rays gi and gp might be ſhewn in the ſame manner of the rays fh and fn, or of any other rays that emerge reſpectively parallel to gi and gp. But all the effectual violet rays are parallel to gi, and all the effectual red rays are parallel to gp. Therefore the effectual violet rays at their emerſion make a leſs angle with the incident ones than the effectual red ones. And for the ſame reaſon, in all the other ſorts of rays, thoſe which are moſt refrangible, at their emerſion from a drop of rain after one reflection, will make a leſs angle with the incident rays, than thoſe do which are leſs refrangible.

Or otherwiſe: When the rays $g i$ and $g p$ emerge at the ſame point g, as they both come out of water into air, and conſequently are refracted from a perpendicular, inſtead of going ſtraight forwards in the line $e g$ continued, they will both be turned round upon the point g from the perpendicular $g o$. Now it is eaſy to conceive, that either of theſe lines might be turned in this manner upon the point g as upon a centre, till they become parallel parallel to $s b$ the incident ray. But if either of theſe lines or rays were refracted ſo much from $g o$ as to become parallel to $s b$, the ray ſo much refracted, would, after emerſion, make no angle with $s k$, becauſe it would be parallel to it. And conſequently that ray which is moſt turned round upon the point g, or that ray which is moſt refrangible, will after emerſion be neareſt parallel to the incident ray, or will make the leaſt angle with it. The ſame may be proved of all other rays emerging parallel to $g i$ and $g p$ reſpectively, or of all effectual rays; thoſe which are moſt refrangible will after emerſion make a leſs angle with the incident rays, than thoſe do which are leaſt refrangible.

But ſince the effectual rays of different colours make different angles with $s k$ at their emerſion, they will be ſeparated from one another: ſo that if the eye was placed in the beam $f g h i$, it would receive only rays of one colour from the drop $x a g y$; and if it was placed in the beam $f g n p$, it would receive only rays of ſome other colour.

The angle $s w p$, which the leaſt refrangible or red rays make with the incident ones when they emerge ſo as to be effectual, is found by calculation to be 42 degrees 2 minutes. And the angle $s k i$, which the moſt refrangible rays make with the incident ones when they emerge ſo as to be effectual, is found to be 40 degrees 17 minutes. The rays which have the intermediate degrees of refrangibility, make with the incident ones intermediate angles between 42 degrees 2 minutes, and 40 degrees 17 minutes.

If a line is ſuppoſed to be drawn from the centre of the ſun thro' the eye of the ſpectator, the angle which any effectual ray, after two refractions and one reflection, makes with the incident ray, will be equal to the angle which it makes with that line.

Plate CCXIII.

Let the eye of the ſpectator be at i, (fig. 7.) and let $q t$ be the line ſuppoſed to be drawn from the centre of the ſun through the eye of the ſpectator; the angle $g i t$, which any effectual ray makes with this line, will be equal to the angle $i k s$, which the ſame ray makes with the incident ray $s b$ or $s k$. If $s b$ is a ray coming from the centre of the ſun, then ſince $q t$ is ſuppoſed to be drawn from the ſame point, theſe two lines, upon account of the remoteneſs of the point from whence they are drawn, may be looked upon as parallel to one another. But the right line $k i$ croſſing theſe two parallel lines will make the alternate angles equal. Euc. b. I, prop. 29. Therefore $k i t$ or $g i t$ is equal to $s k i$.

When the ſun ſhines upon the drops of rain as they are falling; the rays that come from thoſe drops to the eye of a ſpectator, after one reflection and two refractions, produce the primary rainbow.

If the ſun ſhines upon the rain as it falls, there are commonly ſeen two bows, as AFB, CHD, (fig. 9.); or if the cloud and rain does not reach over that whole ſide of the ſky where the bows appear, then only a part of one or of both bows is ſeen in that place where the rain falls. Of theſe two bows, the innermoſt AFB is the more vivid of the two, and this is called the *primary bow*. The outer part TFY of the primary bow is red, the inner part VEX is violet; the intermediate parts, reckoning from the red to the violet, are orange, yellow, green, blue, and indigo. Suppoſe the ſpectator's eye to be at O, and let LOP be an imaginary line drawn from the centre of the ſun through the eye of the ſpectator: if a beam of light S coming from the ſun falls upon any drop F; and the rays that emerge at F in the line FO, ſo as to be effectual, make an angle FOP of $42^{\circ}\,2'$ with the line LP; then theſe effectual rays make an angle of $42^{\circ}\,2'$ with the incident rays, by the preceding propoſition, and conſequently theſe rays will be red, ſo that the drop F will appear red. All the other rays, which emerge at F, and would be effectual if they fell upon the eye, are refracted more than the red ones, and conſequently will paſs above the eye. If a beam of light S falls upon the drop E; and the rays that emerge at E in the line EO, ſo as to be effectual, make an angle EOP of $40^{\circ}\,17'$ with the line LP; then theſe effectual rays make likewiſe an angle of $40^{\circ}\,17'$ with the incident rays, and the drop E will appear of a violet colour. All the other rays, which emerge at E, and would be effectual if they came to the eye, are refracted leſs than the violet ones, and therefore paſs below the eye. The intermediate drops between F and E will for the ſame reaſons be of the intermediate colours.

Thus we have ſhewn why a ſet of drops from F to E, as they are falling, ſhould appear of the primary colours, red, orange, yellow, green, blue, indigo, and violet. It is not neceſſary that the ſeveral drops, which produce theſe colours, ſhould all of them fall at exactly the ſame diſtance from the eye. The angle FOP, for inſtance, is the ſame whether the diſtance of the drop from the eye is OF, or whether it is in any other part of the line OF ſomething nearer to the eye. And whilſt the angle FOP is the ſame, the angle made by the emerging and incident rays, and conſequently the colour of the drop, will be the ſame. This is equally true of any other drop. So that although in the figure the drops F and E are repreſented as falling perpendicularly one under the other, yet this is not neceſſary in order to produce the bow.

But the coloured line FE, which we have already accounted for, is only the breadth of the bow. It ſtill remains to be ſhewn, why not only the drop F ſhould appear red, but why all the other drops quite from A to B in the arc ATFYB ſhould appear of the ſame colour. Now it is evident, that wherever a drop of rain is placed, if the angle which the effectual rays make with the line LP is equal to the angle FOP, that is, if the angle which the effectual rays make with the incident rays is 42° 2′, any of thoſe drops will be red, for the ſame reaſon that the drop F is of this colour.

If FOP was to turn round upon the line OP, ſo that one end of this line ſhould always be at the eye, and the other be at P oppoſite to the ſun; ſuch a motion of this figure would be like that of a pair of compaſſes turning round upon one of the legs OP with the opening FOP. In this revolution the drop F would deſcribe a circle, P would be the centre, and ATFYB would be an arc in this circle. Now ſince, in this motion of the line and drop OF, the angle made by FO with OP, that is, the angle FOP, continues the ſame; if the ſun was to ſhine upon this drop as it revolves, the effectual rays would make the ſame angle with the incident rays, in whatever part of the arc ATFYB the drop was to be. Therefore, whether the drop is at A, or at T, or at Y, or at B, or wherever elſe it is in this whole arc, it would appear red, as it does at F. The drops of rain, as they fall, are not indeed turned round in this manner: but then, as innumerable of them are falling at once in right lines from the cloud, whilſt one drop is at F, there will be others at Y, at T, at B, at A, and in every other part of the arc ATFYB: and all theſe drops will be red for the ſame reaſon that the drop F would have been red, if it had been in the ſame place. Therefore, when the ſun ſhines upon the rain as it falls, there will be a red arc ATFYB oppoſite to the ſun. In the ſame manner, becauſe the drop E is violet, we might prove that any other drop, which, whilſt it is falling, is in any part of the arc AVEXB, will be violet; and conſequently, at the ſame time that the red arc ATFYB appears, there will likewiſe be a violet arc AVEXB below or within it. FE is the diſtance between theſe two coloured arcs; and from what has been ſaid, it follows, that the intermediate ſpace between theſe two arcs will be filled up with arcs of the intermediate colours, orange, yellow, blue, green, and indigo. All theſe coloured arcs together make up the primary rainbow.

The primary rainbow is never a greater arc than a ſemicircle.

SINCE the line LOP is drawn from the ſun through the eye of the ſpectator, and ſince P (fig. 9.) is the centre of the rainbow; it follows, that the centre of the rainbow is always oppoſite to the ſun. The angle FOP is an angle of 42° 2′, as was obſerved, or F the higheſt part of the bow is 42° 2′ from P the centre of it. If the ſun is more than 42° 2′ high, P the centre of the rainbow, which is oppoſite to the ſun, will be more than 42° 2′ minutes below the horizon; and conſequently F the top of the bow, which is only 42° 2′ from P, will be below the horizon; that is, when the ſun is more than 42° 2′ minutes high, no primary rainbow will be ſeen. If the ſun is ſomething leſs than 42° 2′ high, then P will be ſomething leſs than 42° 2′ below the horizon; and conſequently F, which is only 42° 2′ from P, will be juſt above the horizon; that is, a ſmall part of the bow at this height of the ſun will appear cloſe to the ground oppoſite to the ſun. If the ſun is 20° high, then P will be 20° below the horizon; and F the top of the bow, being 42° 2′ from P, will be 22° 2′ above the horizon; therefore, at this height of the ſun, the bow will be an arc of a circle whoſe centre is below the horizon; and conſequently that arc of the circle which is above the horizon, or the bow, will be leſs than a ſemicircle. If the ſun is in the horizon, then P, the centre of the bow, will be in the oppoſite part of the horizon; F, the top of the bow, will be 42° 2′ above the horizon; and the bow itſelf, becauſe the horizon paſſes through the centre of it, will be a ſemicircle. More than a ſemicircle can never appear; becauſe if the bow was more than a ſemicircle, P the centre of it muſt be above the horizon; but P is always oppoſite to the ſun, therefore P cannot be above the horizon, unleſs the ſun is below it; and when the ſun is ſet, or is below the horizon, it cannot ſhine upon the drops of rain as they fall; and conſequently, when the ſun is below the horizon, no bow at all can be ſeen.

When the rays of the ſun fall upon a drop of rain, ſome of them, after two reflections and two refractions, may come to the eye of a ſpectator, who has his back towards the ſun and his face towards the drop.

IF HGW (fig. 8.) is a drop of rain, and parallel rays coming from the ſun, as *zv*, *yw*, fall upon the lower part of it, they will be refracted towards the perpendiculars *vl*, *wl*, as they enter into it, and will deſcribe ſome ſuch lines as *vh*, *wi*. At *h* and *i* great part of theſe rays will paſs out of the drop; but ſome of them will be reflected from thence in the lines *hf*, *ig*. At *f* and *g* again, great part of the rays, that were reflected thither, will paſs out of the drop. But theſe rays will not come to the eye of a ſpectator at *o*. However, here again all the rays will not paſs out; but ſome few will be reflected from *f* and *g*, in ſome ſuch lines as *fd*, *gb*; and theſe, when they emerge out of the drop of water into the air at *b* and *d*, will be refracted from the perpendiculars, and, deſcribing the lines *dt*, *bo*, may come to the eye of the ſpectator who has his back towards the ſun and his face towards the drop.

Thoſe rays, which are parallel to one another after they have been once refracted and once reflected in a drop of rain, will be effectual when they emerge after two refractions and two reflections.

No rays can be effectual, unleſs they are contiguous, and parallel. From what was ſaid, it appears, that when rays come out of a drop of rain contiguous to one another, either after one or after two reflections, they muſt enter the drop nearly at one and the ſame place. And if ſuch rays as are contiguous are parallel after the firſt reflection, they will emerge parallel, and therefore will be effectual. Let *zv* and *yw* be contiguous rays which come from the ſun, and are parallel to one another when they fall upon the lower part of the drop, ſuppoſe theſe rays to be refracted at *v* and *w*, and to be reflected at *h* and *i*; if they are parallel to one another, as *hf*, *gi*, after this firſt reflection, then, after they are reflected a ſecond time from *f* and *g*, and refracted a ſecond time as they emerge at *d* and *b*, they will go out of the drop parallel to one another in the lines *dt* and *bo*, and will therefore be effectual.

The rays *zv*, *yw*, are refracted towards the perpendiculars *vl*, *wl*, when they enter the drop, and will be made to converge. As theſe rays are very oblique, their focus will not be far from the ſurface *vw*. If this focus is at *k*, the rays, after they have paſſed the focus, will diverge from thence in the directions kh, ki; and if ki is the principal focal diſtance of the concave reflecting ſurface hi, the reflected rays hf, ig, will be parallel. Theſe rays ef, ig, are reflected again from the concave ſurface fg, and will meet in a focus at e, ſo that ge will be the principal focal diſtance of this reflecting ſurface fg. And becauſe hi and fg are parts of the ſame ſphere, the principal focal diſtances ge and ki will be equal to one another. When the rays have paſſed the focus e, they will diverge from thence in the lines ed, eb: and we are to ſhew, that when they emerge at d and b, and are refracted there, they will become parallel.

Now if the rays vk, wk, when they have met at k, were to be turned back again in the directions kv, kw, and were to emerge at v and w, they would be refracted into the lines of their incidence, vz, wy, and therefore would be parallel. But ſince ge is equal to ik, as has already been ſhewn, the rays ed, eb, that diverge from e, fall in the ſame manner upon the drop at d and b, as the rays kv, kw, would fall upon it at v and w; and ed, eb, are juſt as much inclined to the refracting ſurface db, as kv, kw, would be to the ſurface vw. From hence it follows, that the rays ed, eb, emerging at d and b, will be refracted in the ſame manner, and will have the ſame direction in reſpect of one another, as kv, kw, would have. But kv and kw would be parallel after refraction. Therefore ed and eb will emerge in lines dp, bo, ſo as to be parallel to one another, and conſequently ſo as to be effectual.

When rays that are effectual emerge from a drop of rain after two reflections and two refractions, thoſe which are moſt refrangible will at their omerſion make a greater angle with the incident rays than theſe do which are leaſt refrangible; and by this means the rays of different colours will be ſeparated from one another.

Plate CCXIII.

If rays of different colours, which are differently refrangible, emerge at any point b, (fig. 8.) theſe rays will not be all of them equally refracted from the perpendicular. Thus, if bo is a red ray, which is of all others the leaſt refrangible, and bm is a violet ray, which is of all others the moſt refrangible; when theſe two rays emerge at b, the violet ray will be refracted more from the perpendicular bx than the red ray, and the refracted angle xbm will be greater than the refracted angle xbo. From hence it follows, that theſe two rays, after emerſion, will diverge from one another. In like manner, the rays that emerge at d will diverge frome one another; a red ray will emerge in the line dp, a violet ray in the line dt. So that though all the effectual red rays of the beam $bdmt$ are parallel to one another, and all the effectual red rays of the beam $bdop$ are likewiſe parallel to one another, yet the violet rays will not be parallel to the red ones, but the violet beam will diverge from the red beam. Thus the rays of different colours will be ſeparated from one another.

This will appear farther, if we conſider what the propoſition affirms, That any violet or moſt refrangible ray will make a greater angle with the incident rays, than any red or leaſt refrangible ray makes with the ſame incident rays. Thus if yw is an incident ray, bm a violet ray emerging from the point b, and bo a red ray emerging from the ſame point; the angle which the violet ray makes with the incident one is yrm, and that which the red ray makes with it is yso. Now yrm is a greater angle than yso. For in the triangle brs the internal angle brs is leſs than bsy the external angle at the baſe. Euc. B. I. prop. 16. But yrm is the complement of brs or of bry to two right ones, and yso is the complement of bsy to two right ones. Therefore, ſince bry is leſs than bsy, the complement of bry to two right angles will be greater than the complement of bsy to two right angles; or yrm will be greater than yso.

Or otherwiſe: Both the rays bo and bm, when they are refracted in paſſing out of the drop at b, are turned round upon the point b from the perpendicular bx. Now either of theſe lines bo or bm might be turned round in this manner, till it made a right angle with yw. Conſequently, that ray which is moſt turned round upon b, or which is moſt refracted, will make an angle with yw that will be nearer to a right one than that ray makes with it which is leaſt turned round upon b, or which is leaſt refracted. Therefore that ray which is moſt refracted will make a greater angle with the incident ray than that which is leaſt refracted.

But ſince the emerging rays, as they are differently refrangible, make different angles with the ſame incident ray yw, the refraction which they ſuffer at emerſion will ſeparate them from one another.

The angle yrm, which the moſt refrangible or violet rays make with the incident ones, is found by calculation to be 54° 7′; and the angle yso, which the leaſt refrangible or red rays make with the incident ones, is found to be 50° 57′: the angles, which the rays of the intermediate colours, indigo, blue, green, yellow, and orange, make with the incidents rays, are intermediate angles between 54° 7′ and 50° 57′.

breadth
° ′
3 10

If a line is ſuppoſed to be drawn from the centre of the ſun through the eye of the ſpectator; the angle, which, after two refractions and two reflections, any effectual ray makes with the incident ray, will be equal to the the angle which it makes with that line.

If yw (fig. 8.) is an incident ray, bo an effectual ray, and qn a line drawn from the centre of the ſun through o the eye of the ſpectator; the angle yso, which the effectual ray makes with the incident ray, is equal to son the angle which the ſame effectual ray makes with the line qn. For yw and qn, conſidered as drawn from the centre of the ſun, are parallel; bo croſſes them, and conſequently makes the alternate angles yso, son, equal to one another. Euc. B. I. Prop. 29.

When the ſun ſhines upon the drops of rain as they are falling; the rays that come from theſe drops to the eye of a ſpectator, after two reflections and two refractions, produce the ſecondary rainbow.

The ſecondary rainbow is the outermoſt CHD, fig. 9. When the ſun ſhines upon a drop of rain H; and the rays HO, which emerge at H ſo as to be effectual, make an angle HOP of 54° 7 with LOP a line drawn from the ſun through the eye of the ſpectator; the ſame effectual rays will make likewiſe an angle of 54° 7′ with the incident rays S, and the rays which emerge at this angle are violet ones, by what was obſerved above. Therefore, if the ſpectator's eye is at O, none but violet rays will enter it: for as all the other rays make a leſs angle with OP, they will fall above the ſpectator's eye. In like manner, if the effectual rays that emerge from the drop G make an angle of 50° 57′ with the line OP, they will likewiſe make the ſame angle with the incident rays S; and conſequently, from the drop G to the ſpectator's eye at O, no rays will come but red ones; for all the other rays, making a greater angle with the line OP, will fall below the eye at O. For the ſame reaſon, the rays emerging from the intermediate drops between H and G, and coming to the ſpectator's eye at O, will emerge at intermediate angles, and therefore will have the intermediate colours. Thus, if there are ſeven drops from H to G incluſively, their colours will be violet, indigo, blue, green, yellow, orange, and red. This coloured line is the breadth of the ſecondary rainbow.

Now, if HOP was to turn round upon the line OP, like a pair of compaſſes upon one of the legs OP with the opening HOP, it is plain from the ſuppoſition, that, in ſuch a revolution of the drop H, the angle HOP would be the ſame, and conſequently the emerging rays would make the ſame angle with the incident ones. But in ſuch a revolution the drop would deſcribe a circle of which P would be the centre, and CNHRD an arc. Conſequently, ſince, when the drop is at N, or at R, or any where elſe in that arc, the emerging rays make the ſame angle with the incident ones as when the drop is at H, the colour of the drop will be the ſame to an eye placed at O, whether the drop is at N, or at H, or at R, or any where elſe in that arc. Now, though the drop does not thus turn round as it falls, and does not paſs through the ſeveral parts of this arc, yet, ſince there are drops of rain falling every where at the ſame time, when one drop is at H, there will be another at R, another at N, and others in all parts of the arc; and theſe drops will all of them be violet-coloured, for the ſame reaſon that the drop H would have been of this colour if it had been in any of thoſe places. In like manner, as the drop G is red when it is at G, it would likewiſe be red in any part of the arc CWGQD; and ſo will any other drop, when, as it is falling, it comes to any part of that arc. Thus as the ſun ſhines upon the rain, whilſt it falls, there will be two arcs produced, a violet coloured one CNHRD, and a red one CWGQD; and for the ſame reaſons the intermediate ſpace between theſe two arcs will be filled up with arcs of the intermediate colours. All theſe arcs together make up the ſecondary rainbow.

The colours of the ſecondary rainbow are fainter than thoſe of the primary rainbow; and are ranged in the contrary order.

THE primary rainbow is produced by ſuch rays as have been only once reflected; the ſecondary rainbow is produced by ſuch rays as have been twice reflected. But at every reflection ſome rays paſs out of the drop of rain without being reflected; ſo that the oftener the rays are reflected, the fewer of them are left. Therefore the colours of the ſecondary bow are produced by fewer rays, and conſequently will be fainter, than the colours of the primary bow.

In the primary bow, reckoning from the outſide of it, the colours are ranged in this order; red, orange, yellow, green, blue, indigo, violet. In the ſecondary bow, reckoning from the outſide, the colours are violet, indigo, blue, green, yellow, orange, red. So that the red, which is the outermoſt or higheſt colour in the primary bow, is the innermoſt or loweſt colour in the ſecondary one.

Now the violet rays, when they emerge ſo as to be effectual after one reflection, make a leſs angle with the incident rays than the red ones; conſequently the violet rays make a leſs angle with the lines OP (fig. 9.) than the red ones. But, in the primary rainbow, the rays are only once reflected, and the angle which the effectual rays make with OP is the diſtance of the coloured drop from P the centre of the bow. Therefore the violet drops, or violet arc, in the primary bow, will be nearer to the centre of the bow, than the red drops or red arc; that is, the innermoſt colour in the primary bow will be violet, and the outermoſt colour will be red. And, for the ſame reaſon, through the whole primary bow, every colour will be nearer to the centre P, as the rays of that colour are more refrangible,

Plate CCXIII.

But the violet rays, when they emerge ſo as to be effectual after two reflections, make a greater angle with the incident rays than the red ones; conſequently the violet rays will make a greater angle with the line OP, than the red ones. But in the ſecondary rainbow the rays are twice reflected, and the angle which effectual rays make with OP is the diſtance of the coloured drop from P the centre of the bow. Therefore the violet drops or violet arc in the ſecondary bow will be farther from the centre of the bow than the red drops or red arc; that is, the outermoſt colour in the ſecondary bow will be violet, and the innermoſt colour will be red. And, for the ſame reaſon, through the whole ſecondary bow, every colour will be further from the centre P, as the rays of that colour are more refrangible.

§ 2. *Of Coronas, Parhelia*, &c.

UNDER the articles CORONA and PARHELION a pretty full account is given of the different hypotheſes concerning theſe phenomena, and likewiſe of the method by which theſe hypotheſes are ſupported, from the known laws of refraction and reflection; to which therefore, in order to avoid repetition, we muſt refer.

§ 3. *Of the Apparent Place, Diſtance, Magnitude, and Motion of Objects.*

PHILOSOPHERS in general had taken for granted, that the place to which the eye refers any viſible object ſeen by reflection or refraction, is that in which the viſual ray meets a perpendicular from the object upon the reflecting or refracting plane. But this method of judging of the place of objects was called in queſtion by Dr Barrow, who contended that the arguments brought in favour of the opinion were not concluſive. Theſe arguments are, that the images of objects appear ſtraight in a plane mirror, but curved in a convex or concave one: that a ſtraight thread, when partly immerſed perpendicularly in water, does not appear crooked as when it is obliquely plunged into the fluid; but that which is within the water ſeems to be a continuation of that which is without. With reſpect to the reflected image, however, of a perpendicular right line from a convex, or concave mirror, he

Apparent place, &c. of objects.

he ſays, that it is not eaſy for the eye to diſtinguiſh the curve that it really makes; and that, if the appearance of a perpendicular thread, part of which is plunged in water, be cloſely attended to, it will not favour the common hypotheſis. If the thread is of any ſhining metal, as ſilver, and viewed obliquely, the image of the part immerſed will appear to detach itſelf ſenſibly from that part which is without the water, ſo that it cannot be true that every object appears to be in the ſame place where the refracted ray meets the perpendicular; and the ſame obſervation he thinks may be extended to the caſe of reflection. According to this writer, we refer every point of an object to the place from which the pencils of light, that give us the image of it, iſſue, or from which they would have iſſued if no reflecting or refracting ſubſtance intervened. Purſuing this principle, he proceeds to inveſtigate the place, in which the rays iſſuing from each of the points of an object, and which reach the eye after one reflection or refraction, meet; and he found, that, if the refracting ſurface was plane, and the refraction was made from a denſer medium into a rarer, thoſe rays would always meet in a place between the eye and a perpendicular to the point of incidence. If a convex mirror be uſed, the caſe will be the ſame; but if the mirror be plane, the rays will meet in the perpendicular, and beyond it if it be concave. He alſo determined, according to theſe principles, what form the image of a right line will take, when it is preſented in different manners to a ſpherical mirror, or when it is ſeen through a refracting medium.

Probable as Dr Barrow thought the maxim which he endeavoured to eſtabliſh, concerning the ſuppoſed place of viſible objects, he has the candour to mention an objection to it, and to acknowledge that he was not able to give a ſatisfactory ſolution of it. It is this. Let an object be placed beyond the focus of a convex lens; and if the eye be cloſe to the lens, it will appear confuſed, but very near to its true place. If the eye be a little withdrawn, the confuſion will increaſe, and the object will ſeem to come nearer; and when the eye is very near the focus, the confuſion will be exceedingly great, and the object will ſeem to be cloſe to the eye. But in this experiment the eye receives no rays but thoſe that are converging; and the point from which they iſſue is ſo far from being nearer than the object, that it is beyond it; notwithſtanding which, the object is conceived to be much nearer than it is, though no very diſtinct idea can be formed of its preciſe diſtance. It may be obſerved, that, in reality, the rays falling upon the eye in this caſe in a manner quite different from that in which they fall upon it in other circumſtances, we can form no judgement about the place from which they iſſue. This ſubject was afterwards taken up by Berkley, Smith, Montucla, and others.

M. De la Hire made ſeveral valuable obſervations concerning the diſtance of viſible objects, and various other phenomena of viſion, which are well worth our notice. He alſo took particular pains to aſcertain the manner in which the eye conforms itſelf to the view of objects placed at different diſtances. He enumerates five circumſtances, which aſſiſt us in judging of the diſtance of objects, namely, their apparent magnitude, the ſtrength of the colouring, the direction of the two eyes, the parallax of the objects, and the diſtinctneſs of their ſmall parts. Painters, he ſays, can only take advantage of the two firſt mentioned circumſtances, and therefore pictures can never perfectly deceive the eye; but in the decorations of theatres, they, in ſome meaſure, make uſe of them all. The ſize of objects, and the ſtrength of their colouring, are diminiſhed in proportion to the diſtance at which they are intended to appear. Parts of the ſame object which are to appear at different diſtances, as columns in an order of architecture, are drawn upon different planes, a little removed from one another, that the two eyes may be obliged to change their direction, in order to diſtinguiſh the parts of the nearer plane from thoſe of the more remote. The ſmall diſtance of the planes ſerves to make a ſmall parallax, by changing the poſition of the eye; and as we do not preſerve a diſtinct idea of the quantity of parallax, correſponding to the different diſtances of objects, it is ſufficient that we perceive there is a parallax, to be convinced that theſe planes are diſtant from one another, without determining what that diſtance is; and as to the laſt circumſtance, viz. the diſtinctneſs of the ſmall parts of objects, it is of no uſe in diſcovering the deception, on account of the falſe light that is thrown upon theſe decorations.

To theſe obſervations concerning deceptions of ſight, we ſhall add a ſimilar one of M. Le Cat, who took notice that the reaſon why we imagine objects to be larger when they are ſeen through a miſt, is the dimneſs or obſcurity with which they are then ſeen; this circumſtance being aſſociated with the idea of great diſtance. This he ſays is confirmed by our being ſurpriſed to find, upon approaching ſuch objects, that they are ſo much nearer to us, as well as ſo much ſmaller, than we had imagined.

Among other caſes concerning viſion, which fell under the conſideration of M. De la Hire, he mentions one which is of difficult ſolution. It is when a candle, in a dark place, and ſituated beyond the limits of diſtinct viſion, is viewed through a very narrow chink in a card; in which caſe a conſiderable number of candles, ſometimes ſo many as ſix, will be ſeen along the chink. This appearance he aſcribes to ſmall irregularities in the ſurface of the humours of the eye, the effect of which is not ſenſible when rays are admitted into the eye through the whole extent of the pupil, and conſequently one principal image effaces a number of ſmall ones; whereas, in this caſe, each of them is formed ſeparately, and no one of them is ſo conſiderable as to prevent the others from being perceived at the ſame time.

There are few perſons, M. De la Hire obſerves, who have both their eyes perfectly equal, not only with reſpect to the limits of diſtinct viſion, but alſo with reſpect to the colour with which objects appear tinged when they are viewed by them, eſpecially if one of the eyes has been expoſed to the impreſſion of a ſtrong light. To compare them together in this reſpect, he directs us to take two thin cards, and to make in each of them a round hole of a third or a fourth of a line in diameter, and, applying one of them to each of the eyes, to look through the holes on a white paper, equally illuminated; when a circle of the paper will appear to each of the eyes, and, placing the cards properly, theſe two circles may be made to touch one another, and thereby the appearance of the ſame object to each of the eyes may be compared to the greateſt advantage. To make this experiment with the greateſt exactneſs, it is neceſſary, he ſays, that the eyes be kept ſhut ſome time before the cards be applied to them.

M. De la Hire firſt endeavoured to explain the cauſe of thoſe dark ſpots which ſeem to float before the eyes, eſpecially thoſe of old people. They are moſt viſible when the eyes are turned towards an uniform white object, as the ſnow in the open fields. If they be fixed when the eye is ſo, this philoſopher ſuppoſed that they were occaſioned by extravaſated blood upon the retina. But he thought that the movable ſpots were occaſioned by opaque matter floating in the aqueous humour of the eye. He thought the vitreous humour was not ſufficiently limpid for this purpoſe.

By the following calculation M. De la Hire gives us an idea of the extreme ſenſibility of the optic nerves. One may ſee very eaſily, at the diſtance of 4000 toiſes, the ſail of a wind-mill, 6 feet in diameter; and the eye being ſuppoſed to be an inch in diameter, the picture of this ſail, at the bottom of the eye, will be $\frac{1}{8000}$ of an inch, which is leſs than the 666th part of a line, and is about the 66th part of a common hair, or the 8th part of a ſingle thread of ſilk. So ſmall, therefore, muſt one of the fibres of the optic nerve be, which he ſays is almoſt inconceivable, ſince each of theſe fibres is a tube that contains ſpirits. If birds perceive diſtant objects as well as men, which he thought very probable, he obſerves that the fibres of their optic nerves muſt be much finer than ours.

The perſon who firſt took much notice of Dr Barrow's hypotheſis was the ingenious Dr Berkley, biſhop of Cloyne, who diſtinguiſhed himſelf ſo much by the objections which he ſtarted to the reality of a material world, and by his oppoſition to the Newtonian doctrine of fluxions. In his eſſay on a new theory of viſion, he obſerves, that the circle formed upon the retina, by the rays which do not come to a focus, produce the ſame confuſion in the eye, whether they croſs one another before they reach the retina, or tend to do it afterwards; and therefore that the judgment concerning diſtance will be the ſame in both the caſes, without any regard to the place from which the rays originally iſſued; ſo that in this caſe, as, by receding from the lens, the confuſion, which always accompanies the nearneſs of an object, increaſes, the mind will judge that the object comes nearer.

But, ſay Dr Smith, if this be true, the object ought always to appear at a leſs diſtance from the eye than that at which objects are ſeen diſtinctly, which is not the caſe: and to explain this appearance, as well as every other in which a judgment is formed concerning diſtance, he maintains, that we judge of it by the apparent magnitude of objects only, or chiefly; ſo that, ſince the image grows lager as we recede from the lens through which it is viewed, we conceive the object to come nearer. He alſo endeavours to ſhew, that, in all caſes in which glaſſes are uſed, we judge of diſtance by the ſame ſimple rule; from which he concludes univerſally, that the apparent diſtance of an object ſeen in a glaſs, is to its apparent diſtance ſeen by the naked eye, as the apparent magnitude to the naked eye is to its apparent magnitude in the glaſs.

But that we do not judge of diſtance merely by the angle under which objects are ſeen, is an obſervation as old as Alhazen, who mentions ſeveral inſtances, in which, though the angles under which objects appear be different, the magnitudes are univerſally and inſtantaneouſly deemed not to be ſo. And Mr Robins clearly ſhews the hypotheſis of Dr Smith to be contrary to fact in the moſt common and ſimple caſes. In microſcopes, he ſays, it is impoſſible that the eye ſhould judge the object to be nearer than the diſtance at which it has viewed the object itſelf, in proportion to the degree of magnifying. For when the microſcope magnifies much, this rule would place the image at a diſtance, of which the ſight cannot poſſibly form any opinion, as being an interval from the eye at which no object can be ſeen. In general, he ſays, he believes, that whoever looks at an object through a convex glaſs, and then at the object itſelf, without the glaſs, will find it to appear nearer in the latter caſe, though it be magnified in the glaſs; and in the ſame trial with the concave glaſs, though by the glaſs the object be diminiſhed, it will appear nearer through the glaſs than without it.

But the moſt convincing proof that the apparent diſtance of the image is not determined by its apparent magnitude is the following experiment. If a double convex glaſs be held upright before ſome luminous object, as a candle, there will be ſeen two images, one erect, and the other inverted. The firſt is made ſimply by reflection from the neareſt ſurface, the ſecond by reflection from the farther ſurface, the rays undergoing a refraction from the firſt ſurface both before and after the reflection. If this glaſs has not too ſhort a focal diſtance, when it is held near the object, the inverted image will appear larger than the other, and alſo nearer; but if the glaſs be carried off from the object, though the eye remain as near to it as before, the inverted image will diminiſh ſo much faſter than the other, that, at length, it will appear very much leſs than it, but ſtill nearer. Here, ſays Mr Robins, two images of the ſame object are ſeen under one view, and their apparent diſtances immediately compared; and here it is evident, that thoſe diſtances have no neceſſary connection with the apparent magnitude. He alſo ſhews how this experiment may be made ſtill more convincing, by ſticking a piece of paper on the middle of the lens, and viewing it thro' a ſhort tube.

M. Bouguer adopts the general maxim of Dr Barrow, in ſuppoſing that we refer objects to the place from which the pencils of rays ſeemingly converge at their entrance into the pupil. But when rays iſſue from below the ſurface of a veſſel of water, or any other refracting medium, he finds that there are always two different places of this ſeeming convergence; one of them of the rays that iſſue from it in the ſame vertical circle, and therefore fall with different degrees of obliquity upon the ſurface of the refracting medium; and another, of thoſe that fall upon the ſurface with the ſame degree of obliquity, entering the eye laterally with reſpect to one another. Sometimes, he ſays, one of theſe images is attended to by the mind, and ſometimes the other, and different images may be obſerved by different perſons. An object plunged in water affords an example, he ſays, of this duplicity of images.

Plate CCXIII.

If BA *b*, fig. 1. be part of the ſurface of water, and the object be at O, there will be two images of it, in two different places; one at G, on the cauſtic by refraction, and the other at E, in the perpendicular AO, which is as much a cauſtic as the other line. The former image is viſible by the rays ODM, O *dm*, which are one higher than the other, in their progreſs to the eye; whereas the image at E is made by the rays ODM, O *ef*, which enter the eye laterally. This, ſays he, may ſerve to explain the difficulty of Father Tacquet, Barrow, Smith, and many other authors, and which Newton himſelf conſidered as a very difficult problem, though it might not be abſolutely inſoluble.

G. W. Krafft has ably ſupported the opinion of Dr Barrow, that the place of any point, ſeen by reflection from the ſurface of any medium, is that in which rays iſſuing from it, infinitely near to one another, would meet; and conſidering the caſe of a diſtant object, viewed in a concave mirror, by an eye very near to it, when the image, according to Euclid and other writers, would be between the eye and the object, and the rule of Dr Barrow cannot be applied, he ſays that in this caſe the ſpeculum may be conſidered as a plane, the effect being the ſame, only the image is more obſcure.

Dr Porterfield gives a diſtinct and comprehenſive view of the natural methods of judging concerning the diſtance of objects.

The conformation of the eye, he obſerves, can be of no uſe to us with reſpect to objects that are placed without the limits of diſtinct viſion. As the object, however, does then appear more or leſs confuſed, according as it is more or leſs removed from thoſe limits, this confuſion aſſiſts the mind in judging of the diſtance of the object; it being always eſteemed ſo much the nearer, or the farther off, by how much the confuſion is greater. But this confuſion hath its limits alſo, beyond which it can never extend; for when an object is placed at a certain diſtance from the eye, to which the breadth of the pupil bears no ſenſible proportion, the rays of light that come from a point in the object, and paſs the pupil, are ſo little diverging, that they may be conſidered as parallel. For a picture on the retina will not be ſenſibly more confuſed, tho' the object be removed to a much greater diſtance.

The moſt univerſal, and frequently the moſt ſure means of judging of the diſtance of objects is, he ſays, the angle made by the optic axis. For our two eyes are like two different ſtations, by the aſſiſtance of which diſtances are taken; and this is the reaſon why thoſe perſons who are blind of one eye, ſo frequently miſs their mark in pouring liquor into a glaſs, ſnuffing a candle, and ſuch other actions as require that the diſtance be exactly diſtinguiſhed. To convince ourſelves of the uſefulneſs of this method of judging of the diſtance of objects, he directs us to ſuſpend a ring in a thread, ſo that its ſide may be towards us, and the hole in it to the right and left hand; and taking a ſmall rod, crooked at the end, retire from the ring two or three paces, and having with one hand covered one of our eyes, to endeavour with the other to paſs the crooked end of the rod thro' the ring. This, ſays he, appears very eaſy; and yet, upon trial, perhaps once in 100 times we ſhall not ſucceed, eſpecially if we move the rod a little quickly.

Our author obſerves, that by perſons recollecting the time when they began to be ſubject to the miſtakes above-mentioned, they may tell when it was that they loſt the uſe of one of their eyes; which many perſons are long ignorant of, and which may be a circumſtance of ſome conſequence to a phyſician †. The uſe of this ſecond method of judging of diſtances De Chales limited to 120 feet; beyond which, he ſays, we are not ſenſible of any difference in the angle of the optic axis.

A third method of judging of the diſtance of objects, conſiſts in their apparent magnitudes, on which ſo much ſtreſs was laid by Dr Smith. From this change in the magnitude of the image upon the retina, we eaſily judge of the diſtance of objects, as often as we are otherwiſe acquainted with the magnitude of the objects themſelves; but as often as we are ignorant of the real magnitude of bodies, we can never, from their apparent magnitude, form any judgment of their diſtance.

From this we may ſee why we are ſo frequently deceived in our eſtimates of diſtance, by any extraordinary magnitudes of objects ſeen at the end of it; as, in travelling towards a large city, or a caſtle, or a cathedral church, or a mountain larger than ordinary, we fancy them to be nearer than we find them to be. This alſo is the reaſon why animals, and all ſmall objects, ſeen in valleys, contiguous to large mountains, appear exceedingly ſmall. For we think the mountain nearer to us than if it were ſmaller; and we ſhould not be ſurpriſed at the ſmallneſs of the neighbouring animals, if we thought them farther off. For the ſame reaſon, we think them exceedingly ſmall when they are placed upon the top of a mountain, or a large building; which appear nearer to us than they really are, on account of their extraordinary ſize.

Dr Jurin clearly accounts for our imagining objects, when ſeen from a high building, to be ſmaller than they are, and ſmaller than we fancy them to be when we view them at the ſame diſtance on level ground. It is, ſays he, becauſe we have no diſtinct idea of diſtance in that direction, and therefore judge of things by their pictures upon the eye only; but cuſtom will enable us to judge rightly even in this caſe.

Let a boy, ſays he, who has never been upon any high building, go to the top of the monument, and look down into the ſtreet; the objects ſeen there, as men and horſes, will appear ſo ſmall as greatly to ſurpriſe him. But 10 or 20 years after, if in the mean time he has uſed himſelf now and then to look down from that and other great heights, he will no longer find the ſame objects to appear ſo ſmall. And if he was to view the ſame objects from ſuch heights as frequently as he ſees them upon the ſame level with himſelf in the ſtreets, he ſuppoſes that they would appear to him juſt of the ſame magnitude from the top of the monument, as they do from a window one ſtory high. For this reaſon it is, that ſtatues placed upon very high buildings ought to be made of a larger ſize than thoſe which are ſeen at a nearer diſtance;

---

† See *Medicine*, n° 455.

ſtance; becauſe all perſons, except architects, are apt to imagine the height of ſuch buildings to be much leſs than it really is.

The fourth method by which Dr Porterfield ſays that we judge of the diſtance of objects, is, the force with which their colour ſtrikes upon our eyes. For if we be aſſured that two objects are of a ſimilar and like colour, and that one appears more bright and lively than the other, we judge that the brighter object is the nearer of the two.

The fifth method conſiſts in the different appearance of the ſmall parts of objects. When theſe parts appear diſtinct, we judge that the object is near; but when they appear confuſed, or when they do not appear at all, we judge that it is at a greater diſtance. For the image of any object, or part of an object, diminiſhes as the diſtance of it increaſes.

The ſixth and laſt method by which we judge of the diſtance of objects is, that the eye does not repreſent to our mind one object alone, but at the ſame time all thoſe that are placed betwixt us and the principal object, whoſe diſtance we are conſidering; and the more this diſtance is divided into ſeparate and diſtinct parts, the greater it appears to be. For this reaſon, diſtances upon uneven ſurfaces appear leſs than upon a plane; for the inequalities of the ſurfaces, ſuch as hills, and holes, and rivers, that lie low and out of ſight, either do not appear, or hinder the parts that lie behind them from appearing; and ſo the whole apparent diſtance is diminiſhed by the parts that do not appear in it. This is the reaſon that the banks of a river appear contiguous to a diſtant eye, when the river is low and not ſeen.

Dr Porterfield very well explains ſeveral fallacies in viſion depending upon our miſtaking the diſtances of objects. Of this kind, he ſays, is the appearance of parallel lines, and long viſtas conſiſting of parallel rows of trees; for they ſeem to converge more and more, as they are farther extended from the eye. The reaſon of this, he ſays, is becauſe the apparent magnitudes of their perpendicular intervals are perpetually diminiſhing, while, at the ſame time, we miſtake their diſtance. Hence we may ſee why, when the two parallel rows of trees ſtand upon an aſcent, whereby the more remote parts appear farther off than they really are, becauſe the line that meaſures the length of the viſtas now appears under a greater angle than when it was horizontal, the trees, in ſuch a caſe, will ſeem to converge leſs, and ſometimes, inſtead of converging, they will be thought to diverge.

For the ſame reaſon that a long viſta appears to converge more and more the farther it is extended from the eye, the remoter parts of a horizontal walk or a long floor will appear to aſcend gradually; and objects placed upon it, the more remote they are, the higher they will appear, till the laſt be ſeen on a level with the eye; whereas the ceiling of a long gallery appears to deſcend towards a horizontal line, drawn from the eye of the ſpectator. For this reaſon, alſo, the ſurface of the ſea, ſeen from an eminence, ſeems to riſe higher and higher the farther we look; and the upper parts of high buildings ſeem to ſtoop, or incline forwards over the eye below, becauſe they ſeem to approach towards a vertical line proceeding from the ſpectator's eye; ſo that ſtatues on the top of ſuch buildings, in order to appear upright, muſt recline, or bend backwards.

Our author alſo ſhews the reaſon why a windmill, ſeen from a great diſtance, is ſometimes imagined to move the contrary way from what it really does, by our taking the nearer end of the ſail for the more remote. The uncertainty we ſometimes find in the courſe of the motion of a branch of lighted candles, turned round at a diſtance, is owing, he ſays, to the ſame cauſe; as alſo our ſometimes miſtaking a convex for a concave ſurface, more eſpecially in viewing ſeals, and impreſſions, with a convex glaſs or a double microſcope; and laſtly, that, upon coming in a dark night into a ſtreet, in which there is but one row of lamps, we often miſtake the ſide of the ſtreet they are on.

Far more light was thrown upon this curious ſubject by M. Bouguer.

The proper method of drawing the appearance of two rows of trees that ſhall appear parallel to the eye, is a problem which has exerciſed the ingenuity of ſeveral philoſophers and mathematicians. That the apparent magnitude of objects decreaſes with the angle under which they are ſeen, has always been acknowledged. It is alſo acknowledged, that it is only by cuſtom and experience that we learn to form a judgment both of magnitudes and diſtances. But in the application of theſe maxims to the above-mentioned problem, all perſons, before M. Bouguer, made uſe of the real diſtance inſtead of the apparent one; by which only the mind can form its judgment. And it is manifeſt, that, if any circumſtances contribute to make the diſtance appear otherwiſe than it is in reality, the apparent magnitude of the object will be affected by it; for the ſame reaſon, that, if the magnitude be miſapprehended, the idea of the diſtance will vary.

For want of attending to this diſtinction, Tacquet pretended to demonſtrate, that nothing can give the idea of two parallel lines (rows of trees for inſtance) to an eye ſituated at one of their extremities, but two hyperbolical curves, turned the contrary way; and M. Varignon maintained, that in order to make a viſta appear of the ſame width, it muſt be made narrower, inſtead of wider, as it recedes from the eye.

M. Bouguer obſerves, that very great diſtances, and thoſe that are conſiderably leſs than them, make nearly the ſame impreſſion upon the eye. We, therefore, always imagine great diſtances to be leſs than they are, and for this reaſon the ground-plan of a long viſta always appears to riſe. The viſual rays come in a determinate direction; but as we imagine that they terminate ſooner than they do, we neceſſarily conceive that the place from which they iſſue is elevated. Every large plane, therefore, as AB, fig. 4. viewed by an eye at O, will ſeem to lie in ſuch a direction as A *b*; and conſequently lines, in order to appear truly parallel on the plane AB, muſt be drawn ſo as that they would appear parallel on the plane A *b*, and be from thence projected to the plane AB.

Plate CCXIII.

To determine the inclination of the apparent ground-plane A *b* to the true ground-plane AB, our ingenious author directs us to draw upon a piece of level ground, two ſtraight lines of a ſufficient length, (for which purpoſe lines faſtened to ſmall ſticks are very convenient), making an angle of 3 or 4 degrees with one another. Then a perſon, placing himſelf within the angle, with his back towards the angular point, muſt walk backwards and forwards till he can fancy the lines to be parallel. In this ſituation, a line drawn from the point of the angle thro' the place of his eye, will contain the ſame angle with the true ground-plane which this does with the apparent one.

M. Bouguer then ſhews other more geometrical methods of determining this inclination; and ſays, that by theſe means he has often found it to be 4 or 5 degrees, though ſometimes only 2 or 2½ degrees. The determination of this angle, he obſerves, is variable; depending upon the manner in which the ground is illuminated, and the intenſity of the light. The colour of the ſoil is alſo not without its influence, as well as the particular conformation of the eye, by which it is more or leſs affected by the ſame degree of light, and alſo the part of the eye on which the object is painted. When, by a ſlight motion of his head, he contrived, that certain parts of the ſoil, the image of which fell towards the bottom of his eye, ſhould fall towards the top of the retina, he always thought that this apparent inclination became a little greater.

But what is very remarkable, and what he ſays he can aſſure his reader may be depended upon, is, that, if he look towards a riſing ground, the difference between the apparent ground-plan and the true one, will be much more conſiderable, ſo that they will ſometimes make an angle of 25 or 30 degrees. Of this he had made frequent obſervations. Mountains, he ſays, begin to be inacceſſible when their ſides made an angle from 35 to 37 degrees with the horizon, as then it is not poſſible to climb them but by means of ſtones or ſhrubs, to ſerve as ſteps to fix the feet on. In theſe caſes, both he and his companions always agreed that the apparent inclination of the ſide of the mountain was 60 or 70 degrees.

Plate CCXIII. Theſe deceptions are repreſented in fig. 3. in which, when the ground plan, AM, or AN, are much inclined, the apparent ground plan A*m*, or A*n*, makes a very large angle with it. On the contrary, if the ground dips below the level, the inclination of the apparent to the true ground-plan diminiſhes, till, at a certain degree of the ſlope, it becomes nothing at all; the two plans AP and A*p* being the ſame, ſo that parallel lines drawn upon them would always appear ſo. If the inclination below the horizon is carried beyond the ſituation AP, the error will increaſe; and what is very remarkable, it will be on the contrary ſide; the apparent plan A*r* being always below the true plan AR, ſo that if a perſon would draw upon the plan AR lines that ſhall appear parallel to the eye, they muſt be drawn converging, and not diverging, as is uſual on the level ground, becauſe they muſt be the projections of two lines imagined to be parallel, on the plan A*r*, which is more inclined to the horizon than AR.

Theſe remarks, he obſerves, are applicable to different planes expoſed to the eye at the ſame time. For if BH, fig. 2. be the front of a building, at the diſtance of AB from the eye, it will be reduced in appearance to the diſtance A*b*; and the front of the building will be *bb*, rather inclined towards the ſpectator, unleſs the diſtance be inconſiderable.

After making a great number of obſervations upon this ſubject, our author concludes, that when a man ſtands upon a level plane, it does not ſeem to riſe ſenſibly but at ſome diſtance from him. The apparent plane, therefore, has a curvature in it, at that diſtance, the form of which is not very eaſy to determine; ſo that a man ſtanding upon a level plane, of infinite extent, will imagine that he ſtands in the centre of a baſon. This is alſo, in ſome meaſure, the caſe with a perſon ſtanding upon the level of the ſea.

He concludes with obſerving that there is no difficulty in drawing lines according to theſe rules, ſo as to have any given effect upon the eye, except when ſome parts of the proſpect are very near the ſpectator, and others very diſtant from him; becauſe, in this caſe, regard muſt be had to the conical or conoidal figure of a ſurface. A right line paſſing at a ſmall diſtance from the obſerver, and below the level of his eye, in that caſe almoſt always appears ſenſibly curved at a certain diſtance from the eye; and almoſt all figures, in this caſe, are ſubject to ſome complicated optical alteration to which the rules of perſpective have not as yet been extended. If a circle be drawn near our feet, and within that part of the ground which always appears level to us, it will always appear to be a circle, and at a very conſiderable diſtance it will appear an ellipſe; but between thoſe two ſituations, it will not appear to be either the one or the other, but will be like one of thoſe ovals of Deſcartes, which is more curved on one of its ſides than the other.

On theſe principles a parterre, which appears diſtorted when it is ſeen in a low ſituation, appears perfectly regular when it is viewed from a balcony or any other eminence. Still, however, the apparent irregularity takes place at a greater diſtance, while the part that is near the ſpectator is exempt from it. If AB, fig. 5. be the ground plane, and A*a* be a perpendicular, under the eye, the higher it is ſituated, at O, to the greater diſtance will T, the place at which the plane begins to have an apparent aſcent along T*b*, be removed.

All the varieties that can occur with reſpect to the viſible motion of objects, are ſuccinctly ſummed up by Dr Porterfield under 11 heads, with which we ſhall preſent our readers.

1. An object moving very ſwiftly is not ſeen, unleſs it be very luminous. Thus a cannon-ball is not ſeen if it is viewed tranſverſely: but if it be viewed according to the line it deſcribes, it may be ſeen, becauſe its picture continues long on the ſame place of the retina; which, therefore, receives a more ſenſible impreſſion from the object.

2. A live coal ſwung briſkly round in a circle appears a continued circle of fire, becauſe the impreſſions made on the retina by light, being of a vibrating, and conſequently of a laſting nature, do not preſently periſh, but continue till the coal performs its whole circuit, and returns again to its former place.

3. If two objects, unequally diſtant from the eye, move with equal velocity, the more remote one will appear the ſlower; or, if their celerities be proportional to their diſtances, they will appear equally ſwift.

4. If two objects, unequally diſtant from the eye, move with unequal velocities in the ſame direction, their apparent velocities are in a ratio compounded of the direct ratio of their true velocities, and the reci-

Apparent place, &c. of objects.

procal one of their diſtances from the eye.

5. A viſible object moving with any velocity appears to be at reſt, if the ſpace deſcribed in the interval of one ſecond be imperceptible at the diſtance of the eye. Hence it is that a near object moving very ſlowly, as the index of a clock, or a remote one very ſwiftly, as a planet, ſeems to be at reſt.

6. An object moving with any degree of velocity will appear at reſt, if the ſpace it runs over in a ſecond of time be to its diſtance from the eye as 1 to 1400.

7. The eye proceeding ſtraight from one place to another, a lateral object, not too far off, whether on the right or left, will ſeem to move the contrary way.

8. The eye proceeding ſtraight from one place to another, and being ſenſible of its motion, diſtant objects will ſeem to move the ſame way, and with the ſame velocity. Thus, to a perſon running eaſtwards, the moon on his right hand appears to move the ſame way, and with equal ſwiftneſs; for, by reaſon of its diſtance, its image continues fixed upon the ſame place of the retina, from whence we imagine that the object moves along with the eye.

9. If the eye and the object move both the ſame way, only the eye much ſwifter than the object, the laſt will appear to go backwards.

10. If two or more objects move with the ſame velocity, and a third remain at reſt, the moveable ones will appear fixed, and the quieſcent in motion, the contrary way. Thus clouds moving very ſwiftly, their parts ſeem to preſerve their ſituation, and the moon to move the contrary way.

11. If the eye be moved with great velocity, lateral objects at reſt appear to move the contrary way. Thus to a perſon ſitting in a coach, and riding briſkly through a wood, the trees ſeem to retire the contrary way; and to people in a ſhip, &c. the ſhores ſeem to recede.

At the concluſion of theſe obſervations, our author endeavours to explain another phenomenon of motion, which, though very common and well known, had not, as far as he knew, been explained in a ſatiſfactory manner. It is this: If a perſon turns ſwiftly round, without changing his place, all objects about will ſeem to move round in a circle the contrary way; and this deception continues not only while the perſon himſelf moves round, but, which is more ſurpriſing, it alſo continues for ſome time after he ceaſes to move, when the eye, as well as the object, is at abſolute reſt.

The reaſon why objects appear to move round the contrary way, when the eye turns round, is not ſo difficult to explain: for though, properly ſpeaking, motion is not ſeen, as not being in itſelf the immediate object of ſight; yet by the ſight we eaſily know when the image changes its place on the retina, and thence conclude that either the object, the eye, or both, are moved. But by the ſight alone we can never determine how far this motion belongs to the object, how far to the eye, or how far to both. If we imagine the eye at reſt, we aſcribe the whole motion to the object, though it be truly at reſt. If we imagine the object at reſt, we aſcribe the whole motion to the eye, though it belongs entirely to the object; and when the eye is in motion, though we are ſenſible of its motion, yet, if we do not imagine that it moves ſo ſwiftly as it really does, we aſcribe only a part of the motion to the eye, and the reſt of it we aſcribe to the object, though it be truly at reſt. This laſt, he ſays, is what happens in the preſent caſe, when the eye turns round; for though we are ſenſible of the motion of the eye, yet we do not apprehend that it moves ſo faſt as it really does; and therefore the bodies about appear to move the contrary way, as is agreeable to experience.

Apparent place, &c. of objects.

But the great difficulty ſtill remains, viz. Why, after the eye ceaſes to move, objects ſhould, for ſome time, ſtill appear to continue in motion, though their pictures on the retina be truly at reſt, and do not at all change their place. This, he imagined, proceeds from a miſtake we are in with reſpect to the eye, which, though it be abſolutely at reſt, we nevertheleſs conceive it as moving the contrary way to that in which it moved before; from which miſtake, with reſpect to the motion of the eye, the objects at reſt will appear to move the ſame way which the eye is imagined to move; and, conſequently, will ſeem to continue their motion for ſome time after the eye is at reſt.

M. Le Cat well explains a remarkable deception, by which a perſon ſhall imagine an object to be on the oppoſite ſide of a board, when it is not ſo, and alſo inverted, and magnified. It is illuſtrated by fig. 3. in which D repreſents the eye, and CB a large black board, pierced with a ſmall hole. E is a large white board, placed beyond it, and ſtrongly illuminated; and *d* a pin, or other ſmall object, held betwixt the eye and the firſt board. In theſe circumſtances, the pin ſhall be imagined to be at F, on the other ſide of the board, where it will appear inverted, and magnified; becauſe what is in fact perceived, is the ſhadow of the pin upon the retina; and the light that is ſtopped by the upper part of the pin coming from the lower part of the enlightened board, and that which is ſtopped by the lower part coming from the upper part of the board, the ſhadow muſt neceſſarily be inverted with reſpect to the object.

Plate CCXIV.

There is a curious phenomenon relating to viſion, which ſome perſons have aſcribed to the inflection of light, but which Mr Melville explains in a very different and very ſimple manner.

When any opaque body is held at the diſtance of three or four inches from the eye, ſo that a part of ſome more diſtant luminous object, ſuch as the window, or the flame of a candle, may be ſeen by rays paſſing near its edge, if another opaque body, nearer to the eye, be brought acroſs from the oppoſite ſide, the edge of the firſt body will ſeem to ſwell outwards, and meet the latter; and in doing ſo will intercept a portion of the luminous object that was ſeen before.

This appearance he explains in the following manner: Let AB, fig. 1. repreſent the luminous object, to which the ſight is directed, CD the more diſtant opaque body, GH the nearer, and EF the diameter of the pupil. Join ED, FD, EG, FG, and produce them till they meet AB in K, N, M, and L. It is plain that the parts AN, MB, of the luminous object cannot be ſeen. But taking any point *a* between N and K, and drawing *a* D *d*, ſince the portion *d* F of the

3 MA 53

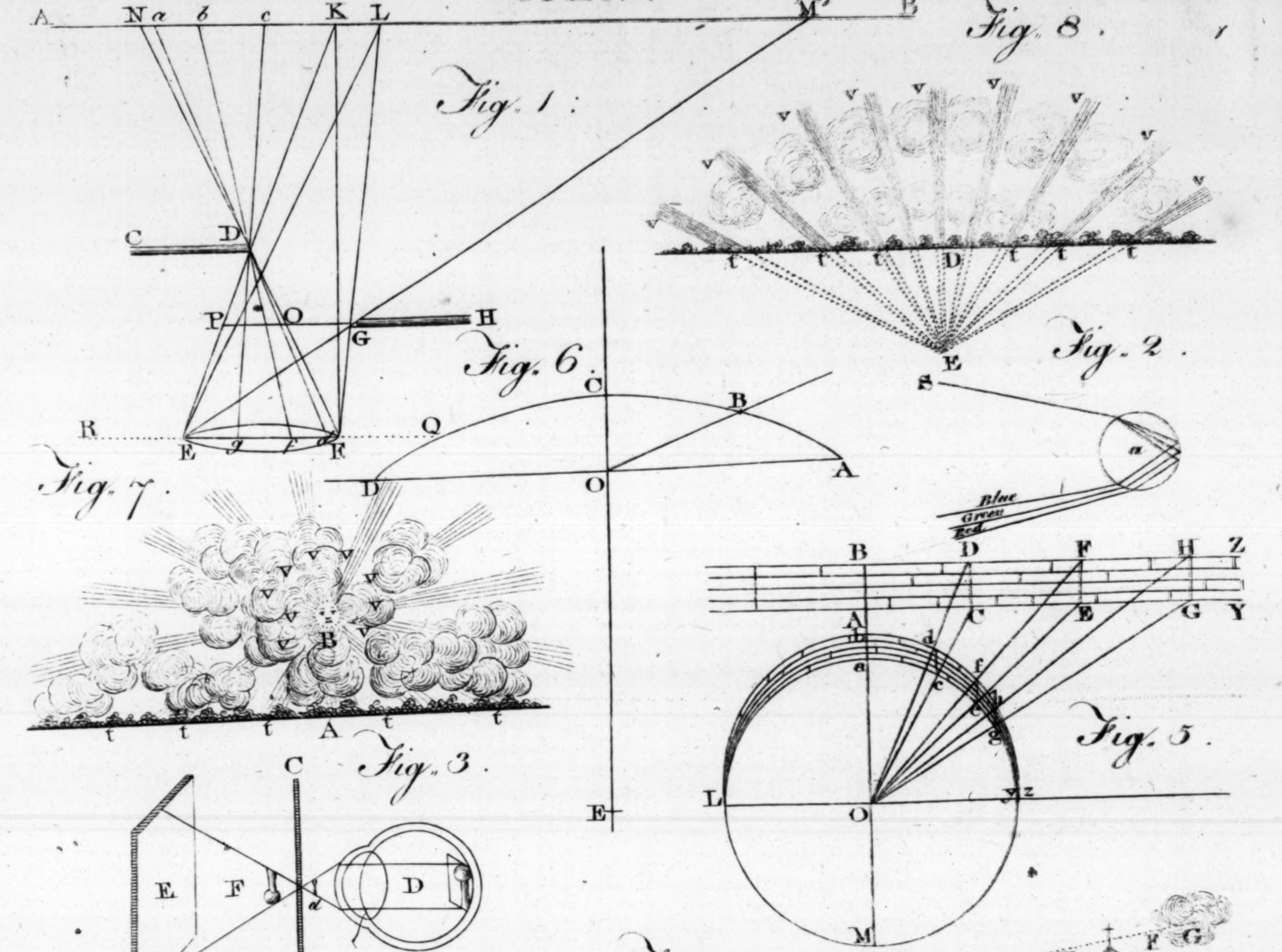


Fig. 1.
A N a b c K L M B
C D
P O G H
R E g f d F Q
Fig. 8.
v v v v v v v v
t t t D t t t
E
Fig. 2.
S
a
Blue
Green
Red
Fig. 6.
C B
D O A
E
Fig. 7.
v v v v v v
B
t t t A t t
Fig. 3.
C
E F d D
B
Fig. 5.
B D F H Z
A C E G Y
b a d c f e h g
L O y z
M
Fig. 4.
E F G
O B D
P A C
Fig. 10.
s s s s s s s s s s s
v x v v v v v C v F v v v v v
B
A t t t O t t t D t t
H
I
E
K
Fig. 9.
f s e
C
B g
h b
A P p O D

A Bell Sculp.

the pupil is filled with light flowing from that point, it muſt be viſible. Any point *b*, between *a* and K, muſt fill *f* F, a greater portion of the pupil, and therefore muſt appear brighter. Again, any point *c*, between *b* and K, muſt appear brighter than *b*, becauſe it fills a greater portion *g* F with light. The point K itſelf, and every other point in the ſpace KL, muſt appear very luminous, ſince they ſend entire pencils of rays EKF, ELF, to the eye; and the viſible brightneſs of every point from L towards M, muſt decreaſe gradually, as from K to N; that is, the ſpaces KN, LM, will appear as dim ſhadowy borders, or fringes, adjacent to the edges of the opaque bodies.

When the edge G is brought to touch the right line KF, the penumbras unite; and as ſoon as it reaches NDF, the above phenomenon begins; for it cannot paſs that right line without meeting ſome line *a* D *d*, drawn from a point between N and K, and, by intercepting all the rays that fall upon the pupil, render it inviſible. In advancing gradually to the line KDE, it will meet other lines *b* D *f*, *c* D *g*, &c. and therefore render the points *b*, *c*, &c. from N to K, ſucceſſively inviſible; and therefore the edge of the fixed opaque body CD muſt ſeem to ſwell outwards, and cover the whole ſpace NK; while GH, by its motion, covers MK. When GH is placed at a greater diſtance from the eye, CD continuing fixed, the ſpace OP to be paſſed over in order to intercept NK is leſs; and therefore, with an equal motion of GH, the apparent ſwelling of CD muſt be quicker; which is found true by experience.

If ML repreſent a luminous object, and REFQ any plane expoſed to its light, the ſpace FQ will be entirely ſhaded from the rays, and the ſpace FE will be occupied by a penumbra, gradually darker, from E to F. Let now GH continue fixed, and CD move parallel to the plane EF; and as ſoon as it paſſes the line LF, it is evident that the ſhadow QF will ſeem to ſwell outwards; and when CD reaches ME, ſo as to cover with its ſhadow the ſpace RE, QF, by its extenſion, will cover FE. This is found to hold true likewiſe by experiment.

§ 4. *Of the Concave Figure of the Sky.*

134
Extent of the viſible horizon on a plane ſurface.

Plate CCXIV. fig. 4.

This apparent concavity is only an optical deception founded on the incapacity of our organs of viſion to take in very large diſtances.—Dr Smith, in his Complete Syſtem of Optics, hath demonſtrated, that, if the ſurface of the earth was perfectly plane, the diſtance of the viſible horizon from the eye would ſcarce exceed the diſtance of 5000 times the height of the eye above the ground, ſuppoſing the height of the eye between five and ſix feet: beyond this diſtance, all objects would appear in the viſible horizon. For, let OP be the height of the eye above the line PA drawn upon the ground; and if an object AB, equal in height to PO, be removed to a diſtance PA equal to 5000 times that height, it will hardly be viſible by reaſon of the ſmallneſs of the angle AOB. Conſequently any diſtance AC, how great ſoever, beyond A, will be inviſible. For ſince AC and BO are parallel, the ray CO will always cut AB in ſome point D between A and B; and therefore the angle AOC, or AOD, will always be leſs than AOB, and therefore AD or AC will be inviſible. Conſequently all objects and clouds, as CE and FG, placed at all diſtances beyond A, if they be high enough to be viſible, or to ſubtend a bigger angle at the eye than AOB, will appear at the horizon AB; becauſe the diſtance AC is inviſible.

135
Why a very long row of objects muſt appear circular.
Fig. 5.

Hence, if we ſuppoſe a vaſt long row of objects, or a vaſt long wall ABZ*y*, built upon this plane, and its perpendicular diſtance OA from the eye at O to be equal to or greater than the diſtance O *a* of the viſible horizon, it will not appear ſtraight, but circular, as if it was built upon the circumference of the horizon *acegy*: and if the wall be continued to an immenſe diſtance, its extreme parts YZ, will appear in the horizon at *yz*, where it is cut by a line O*y* parallel to the wall. For, ſuppoſing a ray YO, the angle YO*y* will become inſenſibly ſmall. Imagine this infinite plane OAY*y*, with the wall upon it, to be turned about the horizontal line O like the lid of a box, till it becomes perpendicular to the other half of the horizontal plane LM*y*, and the wall parallel to it, like a vaſt ceiling over head; and then the wall will appear like the concave figure of the clouds over-head. But though the wall in the horizon appear in the figure of a ſemicircle, yet the ceiling will not, but much flatter. Becauſe the horizontal plane was a viſible ſurface, which ſuggeſted the idea of the ſame diſtances quite round the eye: but in the vertical plane extended between the eye and the ceiling, there is nothing that affects the ſenſe with an idea of its parts but the common line O*y*; conſequently the apparent diſtances of the higher parts of the ceiling will be gradually diminiſhed in aſcending from that line. Now when the ſky is quite overcaſt with clouds of equal gravities, they will all float in the air at equal heights above the earth, and conſequently will compoſe a ſurface reſembling a large ceiling, as flat as the viſible ſurface of the earth. Its concavity therefore is not real, but apparent: and when the heights of the clouds are unequal, ſince their real ſhapes and magnitudes are all unknown, the eye can ſeldom diſtinguiſh the unequal diſtances of thoſe clouds that appear in the ſame directions, unleſs when they are very near us, or are driven by contrary currents of the air. So that the viſible ſhape of the whole ſurface remains alike in both caſes. And when the ſky is either partly overcaſt, or perfectly free from clouds, it is matter of fact that we retain much the ſame idea of its concavity as when it was quite overcaſt.

136
Why the concavity of the ſky appears leſs than a hemiſphere.
Fig. 6.

The concavity of the heavens appears to the eye, which is the only judge of an apparent figure, to be a leſs portion of a ſpherical ſurface than a hemiſphere. Dr Smith ſays, that the centre of the concavity is much below the eye; and by taking a medium among ſeveral obſervations, he found the apparent diſtance of its parts at the horizon to be generally between three and four times greater than the apparent diſtance of its parts overhead. For let the arch ABCD repreſent the apparent concavity of the ſky, O the place of the eye, OA and OC the horizontal and vertical apparent diſtances, whoſe proportion is required. Firſt obſerve when the ſun or the moon, or any cloud or ſtar, is in ſuch a poſition at B, that the apparent arches BA, BC, extended on each ſide of this object towards the

Blue colour of the Sky.

horizon and zenith, ſeem equal to the eye; then taking the altitude of the object B with a quadrant, or a croſs-ſtaff, or finding it by aſtronomy from the given time of obſervation, the angle AOB is known. Drawing therefore the line OB in the poſition thus determined, and taking in it any point B at pleaſure in the vertical line CO produced downwards, ſeek the centre E of a circle ABC, whoſe arches BA, BC, intercepted between B and the legs of the right angle AOC, ſhall be equal to each other; then will this arch ABCD repreſent the apparent figure of the ſky. For by the eye we eſtimate the diſtance between any two objects in the heavens by the quantity of ſky that appears to lie between them; as upon earth we eſtimate it by the quantity of ground that lies between them. The centre E may be found geometrically by conſtructing a cubic equation, or as quick and ſufficiently exact by trying whether the chords BA, BC, of the arch ABC drawn by conjecture are equal, and by altering its radius BE till they are ſo. Now in making ſeveral obſervations upon the ſun, and ſome others upon the moon and ſtars, they ſeemed to our author to biſect the vertical arch ABC at B, when their apparent altitudes or the angle AOB was about 23 degrees; which gives the proportion of OC to OA as 3 to 10 or as 1 to $3\frac{1}{3}$ nearly. When the ſun was but 30 degrees high, the upper arch ſeemed always leſs than the under one; and, in our author's opinion, always greater when the ſun was about 18 or 20 degrees high.

§ 5. *Of the Blue Colour of the ſky, and of Blue and Green Shadows.*

137 Opinions of the ancients, &c.

THE opinions of ancient writers concerning the colour of the ſky merit no notice. The firſt who gave any rational explanation was Fromondus. By him it was ſuppoſed, that the blueneſs of the ſky proceeded from a mixture of the white light of the ſun with the black ſpace beyond the atmoſphere, where there is neither refraction nor reflection. This opinion prevailed very generally even in modern times, and was maintained by Otto Guerick and all his cotemporaries, who aſſerted that white and black may be mixed in ſuch a manner as to make a blue. Mr Bouguer had recourſe to the vapours diffuſed through the atmoſphere, to account for the reflection of the blue rays rather than any other. He ſeems however to ſuppoſe, that it ariſes from the conſtitution of the air itſelf, whereby the fainter coloured rays are incapable of making their way through any conſiderable tract of it. Hence he is of opinion, that the colour of the air is properly blue; to which opinion Dr Smith ſeems alſo to have inclined.

138 Green ſhadows obſerved by M. Buffon.

To this blue colour of the ſky is owing the appearance of blue and green ſhadows in the mornings and evenings.—Theſe were firſt taken notice of by M. Buffon in the month of July 1742, when he obſerved that the ſhadows of trees which fell upon a white wall were green. He was at that time ſtanding upon an eminence, and the ſun was ſetting in the cleft of a mountain, ſo that he appeared conſiderably lower than the horizon. The ſky was clear, excepting in the weſt, which, though free from clouds, was lightly ſhaded with vapours, of a yellow colour, inclining to red. Then the ſun itſelf was exceedingly red, and was ſeemingly, at leaſt, four times as large as he appears to be at mid-day. In theſe circumſtances, he ſaw very diſtinctly the ſhadows of the trees, which were 30 or 40 feet from the white wall, coloured with a light green, inclining to blue. The ſhadow of an arbour, which was three feet from the wall, was exactly drawn upon it, and looked as if it had been newly painted with verdegriſe. This appearance laſted near five minutes; after which it grew fainter, and vaniſhed at the ſame time with the light of the ſun.

139 Blue ſhadows obſerved by him.

The next morning, at ſun riſe, he went to obſerve other ſhadows, upon another white wall; but inſtead of finding them green, as he expected, he obſerved that they were blue, or rather of the colour of lively indigo. The ſky was ſerene, except a ſlight covering of yellowiſh vapours in the eaſt; and the ſun aroſe behind a hill, ſo that it was elevated above his horizon. In theſe circumſtances, the blue ſhadows were only viſible three minutes; after which they appeared black, and in the evening of ſame day he obſerved the green ſhadows exactly as before. Six days paſſed without his being able to repeat his obſervations, on account of the clouds; but the 7th day, at ſun ſet, the ſhadows were not green, but of a beautiful ſky-blue. He alſo obſerved, that the ſky was, in a great meaſure, free from vapours at that time; and that the ſun ſet behind a rock, ſo that it diſappeared before it came to his horizon. Afterwards he often obſerved the ſhadows both at ſunriſe and ſun-ſet; but always obſerved them to be blue, though with a great variety of ſhades of that colour. He ſhewed this phenomenon to many of his friends, who were as much ſurpriſed at it as he himſelf had been; but he ſays that any perſon may ſee a blue ſhadow, if he will only hold his finger before a piece of white paper at ſun-riſe or ſun-ſet.

140 Explanation of the phenomena attempted by Abbé Mazeas.

The firſt perſon who attempted to explain this phenomenon was the Abbé Mazeas, in a memoir of the ſociety in Berlin for the year 1752. He obſerved, that when an opaque body was illuminated by the moon and a candle at the ſame time, and the two ſhadows were caſt upon the ſame white wall, that which was enlightened by the candle was reddiſh, and that which was enlightened by the moon was blue. But, without attending to any other circumſtances, he ſuppoſed the change of colour to be occaſioned by the diminution of the light; but M. Melville, and M. Bouguer, both independent of one another, ſeem to have hit upon the true cauſe of this curious appearance, and which hath been already hinted at.

141 Melville's and Bouguer's explanation.

The former of theſe gentlemen, in his attempts to explain the blue colour of the ſky, obſerves, that ſince it is certain that no body aſſumes any particular colour, but becauſe it reflects one ſort of rays more abundantly than the reſt; and ſince it cannot be ſuppoſed that the conſtituent parts of pure air are groſs enough to ſeparate any colours of themſelves; we muſt conclude with Sir Iſaac Newton, that the violet and blue making rays are reflected more copiouſly than the reſt, by the finer vapours diffuſed through the atmoſphere, whoſe parts are not big enough to give them the appearance of viſible opaque clouds. And he ſhews, that in proper circumſtances, the bluiſh colour of the ſky-light may be actually ſeen on bodies illuminated by it, as, he ſays, it is objected ſhould always happen upon this hypotheſis. For that, if on a clear cloudleſs day a ſheet of white paper be expoſed to the ſun's beams, when any opaque body is placed upon it, the ſhadow which is illuminated by the ſky only will appear remarkably bluiſh compared with the reſt of the paper, which receives the ſun's direct rays.

142
M. Beguelin's explanation of the green ſhadows.

M. Beguelin, who has taken the moſt pains with this ſubject, obſerves, that as M. Buffon mentions the ſhadows appearing green only twice, and that at all other times they are blue, this is the colour which they regularly have, and that the blue was changed into green by ſome accidental circumſtance. Green, he ſays, is only a compoſition of blue and yellow, ſo that this accidental change may have ariſen from the mixture of ſome yellow rays in the blue ſhadow; and that perhaps the wall might have had that tinge, ſo that the blue is the only colour for which a general reaſon is required. And this, he ſays, muſt be derived from the colour of pure air, which always appears blue, and which always reflects that colour upon all objects without diſtinction; but which is too faint to be perceived when our eyes are ſtrongly affected by the light of the ſun, reflected from other objects around us.

143
Some curious phenomena obſerved by him.

To confirm this hypotheſis, he adds ſome curious obſervations of his own, in which this appearance is agreeably diverſified. Being at the village of Boucholtz in July 1764, he obſerved the ſhadows projected on the white paper of his pocket-book, when the ſky was clear. At half an hour paſt 6 in the evening, when the ſun was about four degrees high, he obſerved that the ſhadow of his finger was of a dark grey, while he held the paper oppoſite to the ſun; but when he inclined it almoſt horizontally, the paper had a bluiſh caſt, and the ſhadow upon it was of a beautiful bright blue.

When his eye was placed between the ſun and the paper laid horizontally, it always appeared of a bluiſh caſt; but when he held the paper, thus inclined, between his eye and the ſun, he could diſtinguiſh, upon every little eminence occaſioned by the inequality of the ſurface of the paper, the principal of the priſmatic colours. He alſo perceived them upon his nails, and upon the ſkin of his hand. This multitude of coloured points, red, yellow, green, and blue, almoſt effaced the natural colour of the objects.

At three quarters paſt ſix, the ſhadows began to be blue, even when the rays of the ſun fell perpendicularly. The colour was the moſt lively when the rays fell upon it at an angle of 45° degrees; but with a leſs inclination of the paper, he could diſtinctly perceive, that the blue ſhadow had a border of a ſtronger blue, on that ſide which looked towards the ſky, and a red border on that ſide which was turned towards the earth. To ſee theſe borders, the body that made the ſhadow was obliged to be placed very near the paper; and the nearer it was, the more ſenſible was the red border. At the diſtance of three inches, the whole ſhadow was blue. At every obſervation, after having held the paper towards the ſky, he turned it towards the earth, which was covered with verdure; holding it in ſuch a manner, that the ſun might ſhine upon it while it received the ſhadows of various bodies, but, in this poſition, he could never perceive the ſhadow to be blue or green at any inclination with reſpect to the ſun's rays.

At ſeven o'clock, the ſun being ſtill about two degrees high, the ſhadows were of a bright blue, even when the rays fell perpendicularly upon the paper, but were the brighteſt when it was inclined at an angle of 45°. At this time he was ſurpriſed to obſerve, that a large tract of ſky was not favourable to this blue colour, and that the ſhadow falling upon the paper placed horizontally was not coloured, or at leaſt the blue was very faint. This ſingularity, he concluded, aroſe from the ſmall difference between the light of that part of the paper which received the rays of the ſun, and that which was in the ſhade in this ſituation. In a ſituation preciſely horizontal, the difference would vaniſh, and there could be no ſhadow. Thus too much or too little of the ſun's light produced, but for different reaſons, the ſame effect; for they both made the blue light reflected from the ſky to become inſenſible. This gentleman never ſaw any green ſhadows, but when he made them fall on yellow paper. But he does not abſolutely ſay, that green ſhadows cannot be produced in any other manner; and ſuppoſes, that if it was on the ſame wall that M. Buffon ſaw the blue ſhadows, ſeven days after having ſeen the green ones, he thinks that the cauſe of it might be the mixture of yellow rays, reflected from the vapours, which he obſerves were of that colour.

144
Blue ſhadows not confined to the mornings and evenings.

Theſe blue ſhadows, our author obſerves, are not confined to the times of the ſun-riſing and ſun-ſetting; on the 19th of July, when the ſun has the greateſt force, he obſerved them at three o'clock in the afternoon, but the ſun ſhone through a miſt at that time.

If the ſky is clear, the ſhadows begin to be blue; when, if they be projected horizontally, they are eight times as long as the height of the body that produces them, that is, when the centre of the ſun is 7° 8′ above the horizon. This obſervation, he ſays, was made in the beginning of Auguſt.

Beſides theſe coloured ſhadows, which are produced by the interception of the direct rays of the ſun, our author obſerved others ſimilar to them at ever hour of the day, in rooms into which the light of the ſun was reflected from ſome white body, if any part of the clear ſky could be ſeen from the place, and all unneceſſary light was excluded as much as poſſible. Obſerving theſe precautions, he ſays that the blue ſhadows may be ſeen at any hour of the day, even with the direct light of the ſun; and that this colour will diſappear in all thoſe places of the ſhadow from which the blue ſky cannot be ſeen.

All the obſervations that our author made upon the yellow or reddiſh borders of ſhadows above-mentioned, led him to conclude, that they were occaſioned by the interception of the ſky-light, whereby part of the ſhadow was illuminated either by the red rays reflected from the clouds, when the ſun is near the horizon, or from ſome terreſtrial bodies in the neighbourhood. This conjecture is favoured by the neceſſity he was under of placing any body near the paper, in order to produce this bordered ſhadow, as he ſays it is eaſily demonſtrated, that the interception of the ſky-light can only take place when the breadth of the opaque body is to its diſtance from the white ground on which the ſhadow falls, as twice the ſine of half the amplitude of the ſky to its coſine.

145
Another kind.

At the concluſion of his obſervations on theſe blue ſhadows, he gives a ſhort account of another kind of them, which, he does not doubt, have the ſame origin. Theſe he often ſaw early in the ſpring when he was reading by the light of a candle in the morning, and conſequently the twilight mixed with that of his candle. In theſe circumſtances, the ſhadow that was made by intercepting the light of his candle, at the diſtance of about ſix feet, was of a beautiful and clear blue, which became deeper as the opaque body which made the ſhadow was brought nearer to the wall, and was exceedingly deep at the diſtance of a few inches only. But wherever the day-light did not come, the ſhadows were all black without the leaſt mixture of blue.

§ 6. *Of the Irradiations of the Sun's Light appearing through the interſtices of the Clouds.*

This is an appearance which every one muſt have obſerved when the ſky was pretty much overcaſt with clouds at ſome diſtance from each other. At that time ſeveral large beams of light, ſomething like the appearance of the light of the ſun admitted into a ſmoky room, will be ſeen, generally with a very conſiderable degree of divergence, as if the radiant point was ſituated at no great diſtance above the clouds. Dr Smith obſerves, that this appearance is one of thoſe which ſerve to demonſtrate that very high and remote objects in the heavens do not appear to us in their real ſhapes and poſitions, but according to their perſpective projections on the apparent concavity of the ſky. He acquaints us, that though theſe beams are generally ſeen diverging, as repreſented in fig. 7. it is not always the caſe. He himſelf, in particular, once ſaw them converging towards a point diametrically oppoſite to the ſun: for, as near as he could conjecture, the point to which they converged was ſituated as much below the horizon, as the ſun was then elevated above the oppoſite part of it. This part is repreſented by the line tDt, and the point below it in oppoſition to the ſun is E; towards which all the beams vt, vt, &c. appeared to converge.

Plate CCXIV.

146
Converging irradiations obſerved by Dr Smith.

Fig. 8.

147
The phenomenon explained by him.

"Obſerving, (ſays our author,) that the point of convergence was oppoſite to the ſun, I began to ſuſpect that this unuſual phenomenon was but a caſe of the uſual apparent divergence of the beams of the ſun from his apparent place among the clouds, as repreſented in fig. 7. I ſay, an apparent divergence; for though nothing is more common than for rays to diverge from a luminous body, yet the divergence of theſe beams in ſuch large angles is not real but apparent. Becauſe it is impoſſible for the direct rays of the ſun to croſs one another at any point of the apparent concavity of the ſky, in a greater angle than about half a degree. For the diameter of the earth being ſo extremely ſmall, in compariſon to the diſtance of the ſun, as to ſubtend an angle at any point of his body of but 20 or 22 ſeconds at moſt; and the diameter of our viſible horizon being extremely ſmaller than that of the earth; it is plain, that all the rays which fall upon the horizon, from any given point of the ſun, muſt be inclined to each other in the ſmalleſt angles imaginable; the greateſt of them being as much ſmaller than that angle of 22 ſeconds, as the diameter of the viſible horizon is ſmaller than that of the earth. All the rays that come to us from any given point of the ſun may therefore be conſidered as parallel to each other; as the rays eBg from the point e, or fBh from the oppoſite point f; and conſequently the rays of theſe two pencils that come from oppoſite points of the ſun's real diameter, and croſs each other in the ſun's apparent place B among the clouds, can conſtitute no greater an angle with each other than about half a degree; this angle of their interſection eBf being the ſame as the ſun would appear under to an eye placed among the clouds at B, or (which is much the ſame), to an eye at O upon the ground. Becauſe the ſun's real diſtance OS is inconceivably greater than his apparent diſtance OB. Therefore the rays of the ſun, as Bg, Bh, do really diverge from his apparent place B in no greater angles gBh than about half a degree. Nevertheleſs they appear to diverge from the place B in all poſſible angles, and even in oppoſite directions. Let us proceed then to an explanation of this apparent divergence, which is not ſelf-evident by any means; though at firſt ſight we are apt to think it is, by not diſtinguiſhing the vaſt difference between the true and apparent diſtances of the ſun.

Fig. 9.

Fig. 7.

"What I am going to demonſtrate is this. Suppoſing all the rays of the ſun to fall accurately parallel to each other upon the viſible horizon, as they do very nearly, yet in both caſes they muſt appear to diverge in all poſſible angles. Let us imagine the heavens to be partly overcaſt with a ſpacious bed of broken clouds, v, v, v, &c. lying parallel to the plane of the viſible horizon, here repreſented by the line AOD. And when the ſun's rays fall upon theſe clouds in the parallel lines sv, sv, &c. let ſome of them paſs through their intervals in the lines vt, vt, &c. and fall upon the plane of the horizon at the places t, t, &c. And ſince the reſt of the incident rays sv, sv, are ſuppoſed to be intercepted from the place of the ſpectator at O by the cloud x, and from the intervals between the tranſmitted rays vt, vt, &c. by the clouds v, v, &c. a ſmall part of theſe latter rays vt, vt, when reflected every way from ſome certain kind of thin vapours floating in the air, may undoubtedly be ſufficient to affect the eye with an appearance of lights and ſhades, in the form of bright beams in the places vt, vt, &c. and of dark ones in the intervals between them: juſt as the like beams of light and ſhade appear in a room by reflections of the ſun's rays from a ſmoky or duſty air within it: the lights and ſhades being here occaſioned by the tranſmiſſion of the rays through ſome parts of the window, and by their interruption at other parts.

Fig. 10.

"Now if the apparent concavity of this bed of clouds v, v, to the eye at O, be repreſented by the arch ABCD, and be cut in the point B by the line OBx drawn parallel to the beams tv; it will be evident by the rules of perſpective, that theſe long beams will not appear in their real places, but upon the concave ABCD diverging every way from the place B, where the ſun himſelf appears, or the cloud x that covers his body, as repreſented ſeparately in full view in fig. 7.

"And for the ſame reaſon, if the line BO be produced towards E, below the plane of the horizon AOD, and the eye be directed towards the region of the ſky directly above E, the lower ends of the ſame real beams vt, vt, will now appear upon the part DF of this concave; and will ſeem to converge towards the point E, ſituated juſt as much below the horizon as the oppoſite

3 MA 53

Fig. 1.

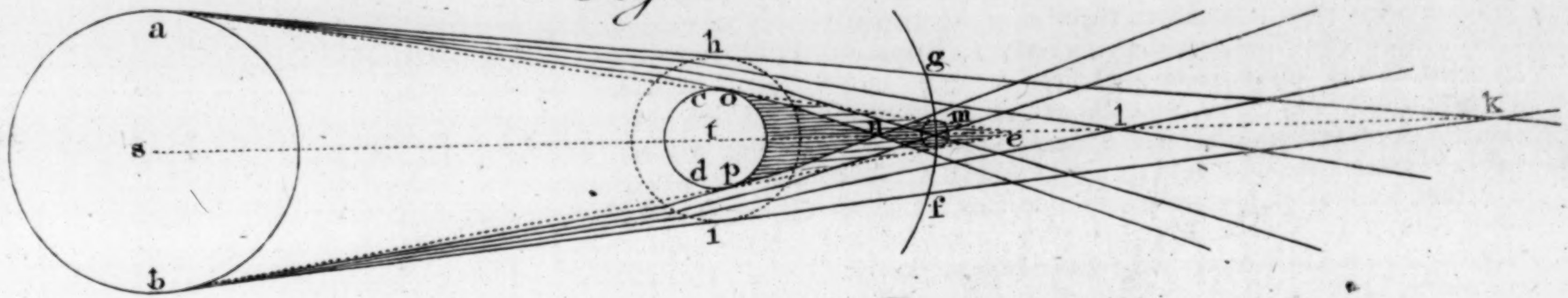

a
h
g
c
o
n
m
l
k
s
t
e
d
p
f
i
b

Fig. 2.

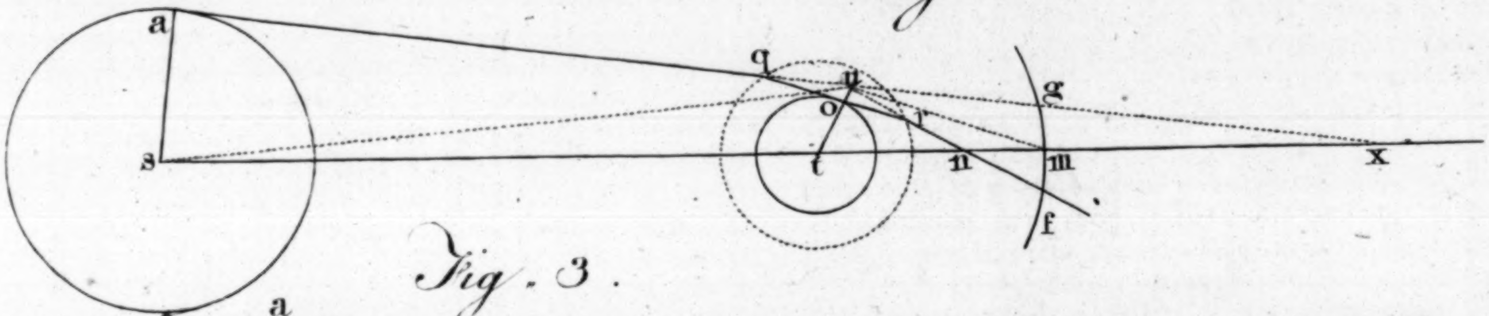

a
q
u
g
o
r
s
t
n
m
x
f

Fig. 3.

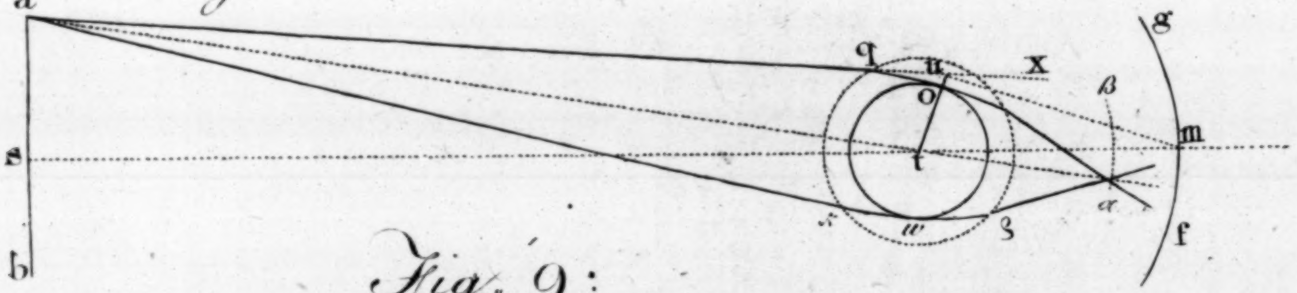

a
g
q
u
x
o
β
m
s
t
α
w
f
b

Fig. 4.

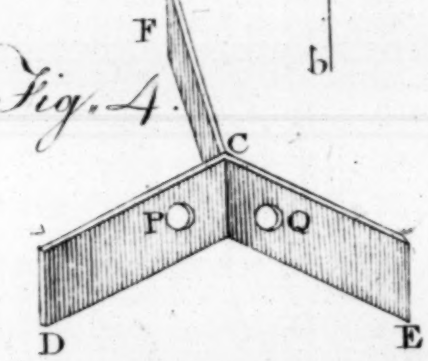


Fig. 9.

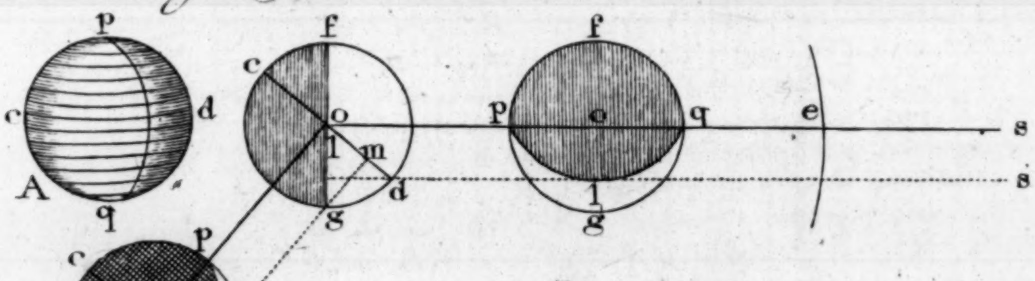

p
f
f
c
d
c
o
p
e
q
s
l
m
s
A
q
g
d
l
g
c
p
o
B
m
d
q
b

Fig. 5.

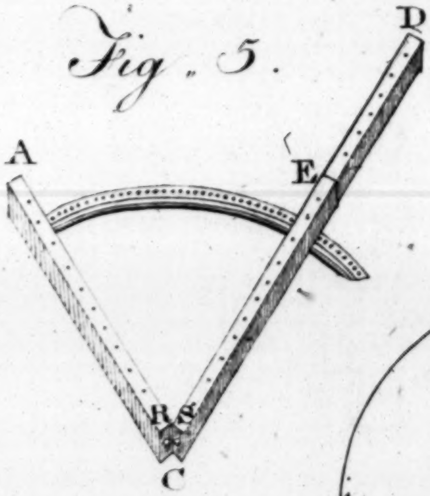


Fig. 6.

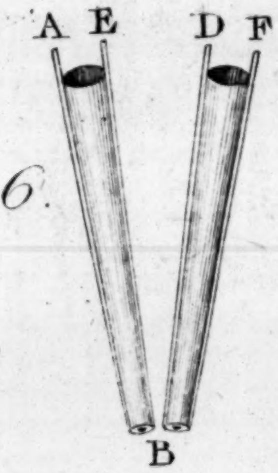


Fig. 7.

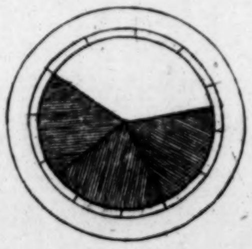
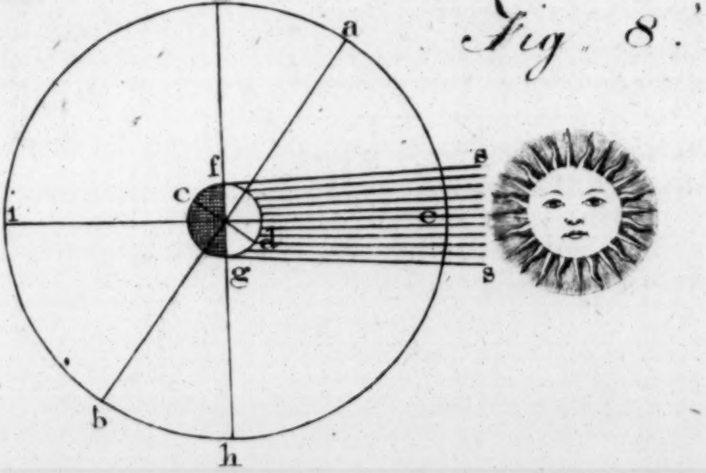


Fig. 8.


k
a
f
c
s
i
e
d
g
s
b
h

A Bell Sculp^t

poſite point B is above it: which is ſeparately repreſented in full view in fig. 8.

“ For if the beams *vt*, *vt*, be ſuppoſed to be viſible throughout their whole lengths, and the eye be directed in a plane perpendicular to them, here repreſented by the line OF; they and their intervals will appear broadeſt in and about this plane, becauſe theſe parts of them are the neareſt to the eye; and therefore their remoter parts and intervals will appear gradually narrower towards the oppoſite ends of the line BE. As a farther illuſtration of this matter, we may conceive the ſpectator at O to be ſituated upon the top of ſo large a deſcent OHI towards a remote valley IK, and the ſun to be ſo very low, that the point E, oppoſite to him, may be ſeen above the horizon of this ſhady valley. In this caſe it is manifeſt, that the ſpectators at O would now ſee theſe beams converging ſo far as to meet each other at the point E in the ſky itſelf.

148 Not obſerved by moon light.

“ I do not remember to have ever ſeen any phenomenon of this kind by moon-light; not ſo much as of beams diverging from her apparent place. Probably her light is too weak after reflections from any kind of vapours, to cauſe a ſenſible appearance of lights and ſhades ſo as to form theſe beams. And in the unuſual phenomenon I well remember, that the converging ſun-beams towards the point below the horizon were not quite ſo bright and ſtrong as thoſe uſually are that diverge from him; and that the ſky beyond them appeared very black (ſeveral ſhowers having paſſed that way), which certainly contributed to the evidence of this appearance. Hence it it is probable that the thinneſs and weakneſs of the reflected rays from the vapours oppoſite to the ſun, is the chief cauſe that this appearance is ſo very uncommon in compariſon to that other of diverging beams. For as the region of the ſky round about the ſun, is always brighter than the oppoſite one; ſo the light of the diverging beams ought alſo to be brighter than that of the converging ones. For, though rays are reflected from rough unpoliſhed bodies in all poſſible directions, yet it is a general obſervation, that more of them are reflected forwards obliquely, than are reflected more directly backwards. Beſides, in the preſent caſe, the incident rays upon the oppoſite region to the ſun, are more diminiſhed by continual reflections from a longer tract of the atmoſphere, than the incident rays upon the region next the ſun.

149 More frequent in ſummer than in winter.

“ The common phenomenon of diverging beams, I think, is more frequent in ſummer than in winter, and alſo when the ſun is lower than when higher up; probably becauſe the lower vapours are denſer and therefore more ſtrongly reflective than the higher; becauſe the lower ſky-light is not ſo bright as the upper; becauſe the air is generally quieter in the mornings and evenings than about noon-day; and laſtly, becauſe many ſorts of vapours are exhaled in greater plenty in ſummer than in winter, from many kinds of volatile vegetables; which vapours, when the air is cooled and condenſed in the mornings and evenings, may become denſe enough to reflect a ſenſible light.”

§ 7. *Of the Illumination of the Shadow of the Earth by the refraction of the Atmoſphere.*

THE ancient philoſophers, who knew nothing of the refractive power of the atmoſphere, were very much perplexed to account for the body of the moon being viſible when totally eclipſed. At ſuch times ſhe generally appears of a dull red colour, like tarniſhed copper, or of iron almoſt red hot. This, they thought, was the moon's native light, by which ſhe became viſible when hid from the brighter light of the ſun. Plutarch indeed, in his diſcourſe upon the face of the moon, attributes this appearance to the light of the fixed ſtars reflected to us by the moon; but this muſt be by far too weak to produce that effect. The true cauſe of it is the ſcattered beams of the ſun bent into the earth's ſhadow by refractions through the atmoſphere in the following manner.

150 Explained by Dr Smith.

Plate CCXV. fig. 1.

“ Let the body of the ſun, ſays Dr Smith, be repreſented by the greater circle *ab*, and that of the earth by the leſſer one *cd*; and let the lines *ace* and *bde* touch them both on their oppoſite ſides, and meet in *e* beyond the earth; then the angular ſpace *ced* will repreſent the conic figure of the earth's ſhadow, which would be totally deprived of the ſun's rays, were none of them bent into it by the refractive power of the atmoſphere. Let this power juſt vaniſh at the circle *hi*, concentric to the earth, ſo that the rays *ah* and *bi*, which touch its oppoſite ſides, may proceed unrefracted, and meet each other at *k*. Then the two neareſt rays to theſe that flow within them, from the ſame points *a* and *b*, being refracted inwards through the margin of the atmoſphere, will croſs each other at a point *l*, ſomewhat nearer to the earth than *k*; and in like manner, two oppoſite rays next within the two laſt will croſs each other at a point *m*, ſomewhat nearer to the earth than *l*, having ſuffered greater refractions, by paſſing thro' longer and denſer tracts of air lying ſomewhat nearer to the earth. The like approach of the ſucceſſive interſections *k*, *l*, *m*, is to be underſtood of innumerable couples of rays, till you come to the interſection *n* of the two innermoſt; which we may ſuppoſe juſt to touch the earth at the points *o* and *p*. It is plain then, that the ſpace bounded by theſe rays *on*, *np*, will be the only part of the earth's ſhadow wholly deprived of the ſun's rays. Let *fmg* repreſent part of the moon's orbit when it is neareſt to the earth, at a time when the earth's dark ſhadow *onp* is the longeſt: in this caſe I will ſhew that the ratio of *tm* to *tn* is about 4 to 3; and conſequently that the moon, tho' centrally eclipſed at *m*, may yet be viſible by means of thoſe ſcattered rays above-mentioned, firſt tranſmitted to the moon by refraction through the atmoſphere, and from thence reflected to the earth.

Fig. 2.

“ For let the incident and emergent parts *aq*, *rn*, of the ray *aqorn*, that juſt touches the earth at *o*, be produced till they meet at *u*, and let *aqu* produced meet the axis *st* produced in *x*; and joining *us* and *um*, ſince the refractions of an horizontal ray paſſing from *o* to *r*, or from *o* to *q*, would be alike and equal, the external angle *nux* is double the quantity of the uſual refraction of an horizontal ray; and the angle *aus* is the apparent meaſure of the ſun's ſemidiameter ſeen from the earth; and the angle *ust* is that of the earth's ſemidiameter *tu* ſeen from the ſun (called his *horizontal parallax*); and laſtly, the angle *umt* is that of the earth's ſemidiameter ſeen from the moon, (called her *horizontal parallax*); becauſe the elevation of the point *u* above the earth, is too ſmall to make a ſenſible error in the quantity of theſe angles; whoſe meaſures by aſtronomical tables are as follow:

′ ″
The ſun's leaſt apparent ſemidiameter = ang. aus = 15—50
The ſun's horizontal parallax - = ang. ust = 00—10

Their difference is - - = ang. txu = 15—40
Double the horizontal refraction = ang. nux = 67—30

Their ſum is - - = ang. tnu = 83—10
The moon's greateſt horizontal parallax = ang. tmu = 62—10

Therefore we have $tm : tn$ :: (ang. tnu : ang. tmu :: 83′—10″ : 62′—10″ ::) 4 : 3 in round numbers; which was to be proved. It is eaſy to collect from the moon's greateſt horizontal parallax of 62′—10″, that her leaſt diſtance tm is about 55⅓ ſemidiameters of the earth; and therefore the greateſt length tn of the dark ſhadow, being three quarters of tm, is about 41½ ſemidiameters.

" The difference of the laſt mentioned angles tnu, tmu, is mun=21′, that is, about two thirds of 31′—40″, the angle which the whole diameter of the ſun ſubtends at u. Whence it follows, that the middle point m of the moon centrally eclipſed, is illuminated by rays which come from two thirds of every diameter of the ſun's diſk, and paſs by one ſide of the earth; and alſo by rays that come from the oppoſite two thirds of every one of the ſaid diameters, and paſs by the other ſide of the earth. This will appear by conceiving the ray $aqorn$ to be inflexible, and its middle point o to ſlide upon the earth, while the part rn is approaching to touch the point m; for then the oppoſite part qa will trace over two thirds of the ſun's diameter. The true proportion of the angles num, aus, could not be preſerved in the ſcheme, by reaſon of the ſun's immenſe diſtance and magnitude with reſpect to the earth.

Plate CCXV. fig. 3.

" Having drawn the line $at\alpha$, is is obſervable, that all the incident rays, as aq, $\alpha\varkappa$, flowing from any one point of the ſun to the circumference of the earth, will be collected to a focus α, whoſe diſtance $t\alpha$ is leſs than tm in the ratio of 62 to 67 nearly; and thus an image of the ſun will be formed at $\alpha\beta$, whoſe rays will diverge upon the moon. For the angle $t\alpha u$ is the difference of the angles $xu\alpha$, $u\alpha t$ found above; and $t\alpha$: tm :: ang. tmu : ang. $t\alpha u$ :: 62′—10″ : 67—30″.

" The rays that flow next above aq and $a\varkappa$, by paſſing through a thinner part of the atmoſphere, will be united at a point in the axis $at\alpha$ ſomewhat farther from the earth than the laſt focus α; and the ſame may be ſaid of the rays that paſs next above theſe, and ſo on; whereby an infinite ſeries of images of the ſun will be formed, whoſe diameters and degrees of brightneſs will increaſe with their diſtances from the earth.

151
Why the moon appears duller when eclipſed in her perigee than in her apogee.

" Hence it is manifeſt why the moon eclipſed in her perigee is obſerved to appear always duller and darker than in her apogee. The reaſon why her colour is always of the copper kind between a dull red and orange, I take to be this. The blue colour of a clear ſky ſhews manifeſtly that the blue-making rays are more copiouſly reflected from pure air than thoſe of any other colour; conſequently they are leſs copiouſly tranſmitted through it among the reſt that come from the ſun, and ſo much the leſs as the tract of air thro' which they paſs is the longer. Hence the common colour of the ſun and moon is whiteſt in the meridian, and grows gradually more inclined to diluted yellow, orange, and red, as they deſcend lower, that is, as the rays are tranſmitted through a longer tract of air; which tract being ſtill lengthened in paſſing to the moon and back again, cauſes a ſtill greater loſs of the blue-making rays in proportion to the reſt; and ſo the reſulting colour of the tranſmitted rays muſt lie between a dark orange and red, according to Sir Iſaac Newton's rule for finding the reſult of a mixture of colours. We have an inſtance of the reverſe of this caſe in leaf-gold, which appears yellow by reflected, and blue by tranſmitted rays. The circular edge of the ſhadow in a partial eclipſe appears red; becauſe the red-making rays are the leaſt refracted of all others, and conſequently are left alone in the conical ſurface of the ſhadow, all the reſt being refracted into it.

§ 8. *Of the Meaſures of Light.*

152
Mr Bouguer's contrivances for meaſuring light.

THAT ſome luminous bodies give a ſtronger, and others a weaker light, and that ſome reflect more light than others, was always obvious to mankind; but no perſon, before Mr Bouguer, hit upon a tolerable method of aſcertaining the proportion that two or more lights bear to one another. The methods he moſt commonly uſed were the following.

Plate CCXV.

He took two pieces of wood or paſteboard EC and CD, fig. 4. in which he made two equal holes P and Q, over which he drew pieces of oiled or white paper. Upon theſe holes he contrived that the light of the different bodies he was comparing ſhould fall; while he placed a third piece of paſteboard FC, to prevent the two lights from mixing with one another. Then placing himſelf ſometimes on one ſide, and ſometimes on the other, but generally on the oppoſite ſide of this inſtrument, with reſpect to the light, he altered their poſition till the papers in the two holes appeared to equally enlightened. This being done, he computed the proportion of their light by the ſquares of the diſtances at which the luminous bodies were placed from the objects. If, for inſtance, the diſtances were as three and nine, he concluded that the light they gave were as nine and eighty-one. Where any light was very faint, he ſometimes made uſe of lenſes, in order to condenſe it; and he incloſed them in tubes or not, as his particular application of them required.

To meaſure the intenſity of light proceeding from the heavenly bodies, or reflected from any part of the ſky, he contrived an inſtrument which reſembles a kind of portable camera obſcura. He had two tubes, of which the inner was black, faſtened at their lower extremities by a hinge C, fig. 5. At the bottom of theſe tubes were two holes, R and S, three or four lines in diameter, covered with two pieces of fine white paper. The two other extremities had each of them a circular aperture, an inch in diameter; and one of the tubes conſiſted of two, one of them ſliding into the other, which produced the ſame effect as varying the aperture at the end. When this inſtrument is uſed, the obſerver has his head, and the end of the inſtrument C, ſo covered, that no light can fall upon his eye, beſides that which comes thro' the two holes S and R, while an aſſiſtant manages the inſtrument, and draws out or ſhortens the tube DE, as the obſerver directs. When the two holes appear equally illuminated, the intenſity of the lights is judged to be inverſely as the ſquares of the tubes.

In uſing this inſtrument, it is neceſſary that the object ſhould ſubtend an angle larger than the aperture A or D, ſeen from the other end of the tube; for, otherwiſe, the lengthening of the tube has no effect. To avoid, in this caſe, making the inſtrument of an inconvenient length, or making the aperture D too narrow, he has recourſe to another expedient. He conſtructs an inſtrument, repreſented fig. 6. conſiſting of two object-glaſſes, AE and DF, exactly equal, fixed in the ends of two tubes ſix or ſeven feet, or, in ſome caſes, 10 or 12 feet long, and having their foci at the other ends. At the bottom of theſe tubes B, are two holes, three or four lines in diameter, covered with a piece of white paper; and this inſtrument is uſed exactly like the former.

Plate CCXV.

If the two objects to be obſerved by this inſtrument be not equally luminous, the light that iſſues from them muſt be reduced to an equality, by diminiſhing the aperture of one of the object-glaſſes; and then the remaining ſurface of the two glaſſes will give the proportion of their lights. But for this purpoſe, the central parts of the glaſs muſt be covered in the ſame proportion with the parts near the circumference, leaving the aperture ſuch as is repreſented fig. 7. becauſe the middle part of the glaſs is thicker and leſs tranſparent than the reſt.

If all the objects to be obſerved lie nearly in the ſame direction, our author obſerves, that theſe two long tubes may be reduced into one, the two object-glaſſes being placed cloſe together, and one eye-glaſs ſufficing for them both. The inſtrument will then be the ſame with that of which he publiſhed an account in 1748, and which he called a *heliometer*, or *aſtrometer*.

153 These inſtruments meaſure only the intenſity of the light.

Our author obſerves, that it is not the abſolute quantity, but only the intenſity of the light, that is meaſured by theſe two inſtruments, or the number of rays, in proportion to the ſurface of the luminous body; and it is of great importance that theſe two things be diſtinguiſhed. The intenſity of light may be very great, when the quantity, and its power of illuminating other bodies, may be very ſmall, on account of the ſmallneſs of its ſurface; or the contrary may be the caſe, when the ſurface is large.

Having explained theſe methods which M. Bouguer took to meaſure the different proportions of light, we ſhall ſubjoin in this place a few miſcellaneous examples of his application of them.

It is obſervable, that when a perſon ſtands in a place where there is a ſtrong light, he cannot diſtinguiſh objects that are placed in the ſhade; nor can he ſee any thing upon going immediately into a place where there is very little light. It is plain, therefore, that the action of a ſtrong light upon the eye, and alſo the impreſſion which it leaves upon it, makes it inſenſible to the effect of a weaker light. M. Bouguer had the curioſity to endeavour to aſcertain the proportion between the intenſities of the two lights in this caſe; and by throwing the light of two equal candles upon a board, he found that the ſhadow made by intercepting the light of one of them, could not be perceived by his eye, upon the place enlightened by the other, at little more than eight times the diſtance; from whence he concluded, that when one light is eight times eight, or 64 times leſs than another, its preſence or abſence will not be perceived. He allows, however, that the effect may be different on different eyes; and ſuppoſes that the boundaries in this caſe, with reſpect to different perſons, may lie between 60 and 80.

Applying the two tubes of his inſtrument, mentioned above, to meaſure the intenſity of the light reflected from different parts of the ſky; he found, that when the ſun was 25 degrees high, the light was four times ſtronger at the diſtance of eight or nine degrees from his body, than it was at 31 or 32 degrees. But what ſtruck him the moſt was to find, that when the ſun is 15 or 20 degrees high, the light decreaſes on the ſame parallel to the horizon to 110 or 120 degrees, and then increaſes again to the place exactly oppoſite to the ſun.

The light of the ſun, our author obſerves, is too ſtrong, and that of the ſtars too weak, to determine the variation of their light at different altitudes: but as, in both caſes, it muſt be in the ſame proportion with the diminution of the light of the moon in the ſame circumſtances, he made his obſervations on that luminary, and found, that its light at 19° 16′, is to its light at 66° 11′, as 1681 to 2500; that is, the one is nearly two thirds of the other. He choſe thoſe particular altitudes, becauſe they are thoſe of the ſun at the two ſolſtices at Croiſic, where he then reſided. When one limb of the moon touched the horizon of the ſea, its light was 2000 times leſs than at the altitude of 66° 11′. But this proportion he acknowledges muſt be ſubject to many variations, the atmoſphere near the earth varying ſo much in its denſity. From this obſervation he concludes, that at a medium light is diminiſhed in the proportion of about 2500 to 1681, in traverſing 7469 toiſes of denſe air.

154 Great variation of the light of the moon at different altitudes.

155 Variation in different parts of the diſks of the ſun and planets.

Laſtly, our accurate philoſopher applied his inſtrument to the different parts of the ſun's diſk, and found that the centre is conſiderably more luminous than the extremities of it. As near as he could make the obſervation, it was more luminous than a part of the diſk ¾ths of the ſemi-diameter from it, in the proportion of 28 to 35; which, as he obſerves, is more than in the proportion of the ſines of the angles of obliquity. On the other hand, he obſerves, that both the primary and ſecondary planets are more luminous at their edges than near their centres.

The compariſon of the light of the ſun and moon is a ſubject that has frequently exerciſed the thoughts of philoſophers; but we find nothing but random conjectures, before our author applied his accurate meaſures in this caſe. In general, the light of the moon is imagined to bear a much greater proportion to that of the ſun than it really does; and not only are the imaginations of the vulgar, but thoſe of philoſophers alſo, impoſed upon with reſpect to it. It was a great ſurpriſe to M. De la Hire to find that he could not, by the help of any burning mirror, collect the beams of the moon in a ſufficient quantity to produce the leaſt ſenſible heat. Other philoſophers have ſince made the like attempts with mirrors of greater power, tho' without any greater ſucceſs; but this will not ſurpriſe us, when we ſee the reſult of M. Bouguer's obſervations on this ſubject.

156 Mr Bouguer's calculation concerning the light of the moon.

In order to ſolve this curious problem concerning the compariſon of the light of the ſun and moon, he compared each of them to that of a candle in a dark room, one in the day-time, and the other in the night following, when the moon was at her mean diſtance from the earth; and, after many trials, he concluded that the light of the ſun is about 300,000 times greater than that of the moon; which is ſuch a diſproportion, that, as he obſerves, it can be no wonder that philoſophers have had ſo little ſucceſs in their attempts to collect the light of the moon with burning-glaſſes. For the largeſt of them will not increaſe the light 1000 times; which will ſtill leave the light of the moon, in the focus of the mirror, 300 times leſs than the intenſity of the common light of the ſun.

To this account of the proportion of light which we actually receive from the moon, it cannot be diſpleaſing to the reader, if we compare it with the quantity which would have been tranſmitted to us from that opaque body, if it reflected all the light it receives. Dr Smith thought that he had proved, from two different conſiderations, that the light of the full moon would be to our day-light as one to about 90,900, if no rays were loſt at the moon.

157 Dr Smith's calculation.

In the firſt place, he ſuppoſes that the moon, enlightened by the ſun, is as luminous as the clouds are at a medium. He therefore ſuppoſed the light of the ſun to be equal to that of a whole hemiſphere of clouds, or as many moons as would cover the ſurface of the heavens. But on this Dr Prieſtley obſerves, that it is true, the light of the ſun ſhining perpendicularly upon any ſurface would be equal to the light reflected from the whole hemiſphere, if every part reflected all the light that fell upon it; but the light that would in fact be received from the whole hemiſphere (part of it being received obliquely) would be only one-half as much as would be received from the whole hemiſphere if every part of it ſhone directly upon the ſurface to be illuminated.

In his Remarks, par. 97, Dr Smith demonſtrates his method of calculation in the following manner:

Plate CCXV. fig. 8.

“ Let the little circle *cfdg* repreſent the moon's body half enlightened by the ſun, and the great circle *aeb*, a ſpherical ſhell concentric to the moon, and touching the earth; *ab*, any diameter of that ſhell perpendicular to a great circle of the moon's body, repreſented by its diameter *cd*; *e* the place of the ſhell receiving full moon-light from the bright hemiſphere *fdg*. Now, becauſe the ſurface of the moon is rough like that of the earth, we may allow that the ſun's rays, incident upon any ſmall part of it, with any obliquity, are reflected from it every way alike, as if they were emitted. And therefore, if the ſegment *df* ſhone alone, the points *a*, *e*, would be equally illuſtrated by it; and likewiſe if the remaining bright ſegment *dg* ſhone alone, the points *b e* would be equally illuſtrated by it. Conſequently, if the light at the point *a* was increaſed by the light at *b*, it would become equal to the full moon-light at *e*. And conceiving the ſame transfer to be made from every point of the hemiſpherical ſurface *hbik* to their oppoſite points in the hemiſphere *kaeh*, the former hemiſphere would be left quite dark, and the latter would be uniformly illuſtrated with full moon-light; ariſing from a quantity of the ſun's light, which, immediately before its incidence on the moon, would uniformly illuſtrate a circular plane equal to a great circle of her body, called her *diſk*. Therefore the quantities of light being the ſame upon both ſurfaces, the denſity of the ſun's incident light, is to the denſity of full moon-light, as that hemiſpherical ſurface *hek* is to the ſaid diſk; that is, as any other hemiſpherical ſurface whoſe centre is at the eye, to that part of it which the moon's diſk appears to poſſeſs very nearly, becauſe it ſubtends but a ſmall angle at the eye: that is, as radius of the hemiſphere to the verſed ſine of the moon's apparent ſemidiameter, or as 10,000,000 to $1106\frac{2}{3}$ or as 90,400 to 1; taking the moon's mean horizontal diameter to be 16′ 7″.

“ Strictly ſpeaking, this rule compares moon-light at the earth with day-light at the moon; the medium of which, at her quadratures, is the ſame as our day-light; but is leſs at her full in the duplicate ratio of 365 to 366, or thereabout; that is, of the ſun's diſtances from the earth and full moon: and therefore full-moon light would be to our day-light, as about 1 to 90,900, if no rays were loſt at the moon.

Fig. 9.

“ Secondly, I ſay that full-moon light is to any other moon-light as the whole diſk of the moon to the part that appears enlightened, conſidered upon a plane ſurface. For now let the earth be at *b*, and let *dl* be perpendicular to *fg*, and *gm* to *cd*: then it is plain, that *gl* is equal to *dm*; and that *gl* is equal to a perpendicular ſection of the ſun's rays incident upon the arch *dg*, which at *b* appears equal to *dm*; the eye being unable to diſtinguiſh the unequal diſtances of its parts. In like manner, conceiving the moon's ſurface to conſiſt of innumerable phyſical circles parallel to *cfdg*, as repreſented at A, the ſame reaſon holds for every one of theſe circles as for *cfdg*. It follows then, that the bright part of the ſurface viſible at *b*, when reduced to a flat as repreſented at B, by the creſcent *pdqmp*, will be equal and ſimilar to a perpendicular ſection of all the rays incident on that part, repreſented at C by the creſcent *pgqlp*. Now the whole diſk being in proportion to this creſcent, as the quantities of light incident upon them; and the light falling upon every rough particle, being equally rarified in diverging to the eye at *b*, conſidered as equidiſtant from them all; it follows, that full moon-light is to this moon-light as the whole diſk *pdqc* to the creſcent *pdqmp*.

“ Therefore, by compounding this ratio with that in the former remark, day light is to moon-light as the ſurface of an hemiſphere whoſe centre is at the eye, to the part of that ſurface which appears to be poſſeſſed by the enlightened part of the moon.

158 Mr Michell's calculation.

Mr Michell made his computation in a much more ſimple and eaſy manner, and in which there is much leſs danger of falling into any miſtake. Conſidering the diſtance of the moon from the ſun, and that the denſity of the light muſt decreaſe in the proportion of the ſquare of that diſtance, he calculated the denſity of the ſun's light, at that diſtance, in proportion to its denſity at the ſurface of the ſun; and in this manner he found, that if the moon reflected all the light it receives from the ſun, it would only be the 45,000th part of the light we receive from the greater luminary. Admitting, therefore, that moon light is only a 300,000th part of the light of the ſun, Mr Michell concludes, that it reflects no more than between the 6th and 7th part of what falls upon it.

Sect. IV. *Of Optical Inſtruments.*

§ 1. *The Multiplying-glaſs.*

Plate CCXVI.

The multiplying-glaſs is made by grinding down the round ſide *hik* (fig. 1.) of a convex glaſs AB, into ſeveral flat ſurfaces, as *hb*, *bld*, *dk*. An object C will not appear magnified when ſeen through this glaſs by the eye at H; but it will appear multiplied into as many different objects as the glaſs contains plane ſurfaces. For, ſince rays will flow from the object C to all parts of the glaſs, and each plane ſurface will refract theſe rays to the eye, the ſame object will appear to the eye in the direction of the rays which enter it through each ſurface. Thus, a ray *gi*H, falling perpendicularly on the middle ſurface, will go through the glaſs to the eye without ſuffering any refraction; and will therefore ſhew the object in its true place at C: whilſt a ray *ab* flowing from the ſame object, and falling obliquely on the plane ſurface *bh*, will be refracted in the direction *be*, by paſſing through the glaſs; and, upon leaving it, will go on to the eye in the direction *e*H; which will cauſe the ſame object C to appear alſo at E, in the direction of the ray H*e*, produced in the right line H*en*. And the ray *cd*, flowing from the object C, and falling obliquely on the plane ſurface *dk*, will be refracted (by paſſing through the glaſs, and leaving it at *f*) to the eye at H; which will cauſe the ſame object to appear at D, in the direction H*fm*.—If the glaſs be turned round the line *gl*H, as an axis, the object C will keep its place, becauſe the ſurface *bld* is not removed; but all the other objects will ſeem to go round C, becauſe the oblique planes, on which the rays *a b c d* fall, will go round by the turning of the glaſs.

§ 2. *Mirrors.*

1. *The Plane Mirror, or common Looking-glaſs.* The image of any object that is placed before a plane mirror, appears as big to the eye as the object itſelf; and is erect, diſtinct, and ſeemingly as far behind the mirror, as the object is before it; and that part of the mirror which reflects the image of the object to the eye (the eye being ſuppoſed equally diſtant from the glaſs with the object) is juſt half as long and half as broad as the object itſelf. Let AB (fig. 3.) be an object placed before the reflecting ſurface *ghi* of the plane mirror CD; and let the eye be at *o*. Let A*h* be a ray of light flowing from the top A of the object and falling upon the mirror at *h*, and *hm* be a perpendicular to the ſurface of the mirror at *h*; the ray A*h* will be reflected from the mirror to the eye at *o*, making an angle *mho*, equal to the angle A*hm*: then will the top of the image E appear to the eye in the direction of the reflected ray *oh* produced to E, where the right line A*p*E, from the top of the object, cuts the right line *oh*E, at E. Let B*i* be a ray of light proceeding from the foot of the object at B to the mirror at *i*; and *ni* a perpendicular to the mirror from the point *i*, where the ray B*i* falls upon it: this ray will be reflected in the line *io*, making an angle *nio*, equal the angle B*in*, with that perpendicular, and entering the eye at *o*; then will the foot F of the image appear in the direction of the reflected ray *oi*, produced to F, where the right line BF cuts the reflected ray produced to F. All the other rays that flow from the intermediate points of the object AB, and fall upon the mirror between *h* and *i*, will be reflected to the eye at *o*; and all the intermediate points of the image EF will appear to the eye in the direction of theſe reflected rays produced. But all the rays that flow from the object, and fall upon the mirror above *h*, will be reflected back above the eye at *o*; and all the rays that flow from the object, and fall upon the mirror below *i*, will be reflected back below the eye at *o*; ſo that none of the rays that fall above *h*, or below *i*, can be reflected to the eye at *o*; and the diſtance between *h* and *i* is equal to half the length of the object AB.

169 Size of a looking-glaſs in which a man will ſee his whole image.

Hence it appears, that if a man ſees his whole image in a plane looking-glaſs, the part of the glaſs that reflects his image muſt be juſt half as long and half as broad as himſelf, let him ſtand at any diſtance from it whatever; and that his image muſt appear juſt as far behind the glaſs as he is before it. Thus, the man AB (fig 4.) viewing himſelf in the plane mirror CD, which is juſt half as long as himſelf, ſees his whole image as at EF, behind the glaſs, exactly equal to his own ſize. For, a ray AC proceeding from his eye at A, and falling perpendicularly upon the ſurface of the glaſs at C, is reflected back to his eye, in the ſame line CA; and the eye of his image will appear at E, in the ſame line produced to E, beyond the glaſs. And a ray BD, flowing from his foot, and falling obliquely on the glaſs at D, will be reflected as obliquely on the other ſide of the perpendicular *ab*D, in the direction DA; and the foot of his image will appear at F, in the direction of the reflected ray AD, produced to F, where it is cut by the right line BGF, drawn parallel to the right line ACE. Juſt the ſame as if the glaſs were taken away, and a real man ſtood at F, equal in ſize to the man ſtanding at B: for to his eye at A, the eye of the other man at E would be ſeen in the direction of the line ACE; and the foot of the man at F would be ſeen by the eye A, in the direction of the line ADF.

If the glaſs be brought nearer the man AB, as ſuppoſe to *cb*, he will ſee his image as at CDG: for the reflected ray CA (being perpendicular to the glaſs) will ſhew the eye of the image as at C; and the incident ray B*b*, being reflected in the line *b*A, will ſhew the foot of his image as at G; the angle of reflection *ab*A being always equal to the angle of incidence B*ba*: and ſo of all the intermediate rays from A to B. Hence, if the man AB advances towards the glaſs CD, his image will approach towards it; and if he recedes from the glaſs, his image will alſo recede from it.

If the object be placed before a common looking-glaſs, and viewed obliquely, three, four, or more images of it will appear behind the glaſs.

Plate CCXII.

260 Why three or four images of objects are ſeen in plane mirrors.

To explain this, let ABCD (fig. 11.) repreſent the glaſs; and let EF be the axis of a pencil of rays flowing from E, a point in an object ſituated there. The rays of this pencil will in part be reflected at F, ſuppoſe into the line FG. What remains will (after refraction at F, which we do not conſider here) paſs on to H; from whence (on account of the quickſilver which is ſpread over the ſecond ſurface of glaſſes of this kind to prevent any of the rays from being tranſmitted there) they will be ſtrongly reflected to K, where part of them will emerge and enter an eye at L. By this means one repreſentation of the ſaid point will be formed in the line LK produced, ſuppoſe in M: Again, another pencil, whoſe axis is E N, firſt reflected at N, then at O, and afterwards at P, will form a ſecond repreſentation of the ſame point at Q: And thirdly, another pencil, whoſe axis is ER, after reflection at the ſeveral points R, S, H, T, V, ſucceſſively, will exhibit a third repreſentation of the ſame point at X; and ſo on *in infinitum*. The ſame being true of each point in the object, the whole will be repreſented in the like manner; but the repreſentations will be faint, in proportion to the number of reflections the rays ſuffer, and the length of their progreſs within the glaſs. We may add to theſe another repreſentation of the ſame object in the line LO produced, made by ſuch of the rays as fall upon O, and are from thence reflected to the eye at L.

This experiment may be tried by placing a candle before the glaſs as at E, and viewing it obliquely, as from L.

2. *Of Concave and Convex Mirrors.* The effects of theſe in magnifying and diminiſhing objects have been already in general explained; but for the better underſtanding the nature of reflecting teleſcopes, it will ſtill be proper to ſubjoin the following particular deſcription of the effects of concave ones.

Plate CCXVII.

When parallel rays, (fig. 2.) as *d f a*, C *m b*, *e l c*, fall upon a concave mirror AB (which is not tranſparent, but has only the ſurface A *b* B of a clear poliſh) they will be reflected back from that mirror, and meet in a point *m*, at half the diſtance of the ſurface of the mirror from C the centre of its concavity; for they will be reflected at as great an angle from a perpendicular to the ſurface of the mirror, as they fell upon it with regard to that perpendicular, but on the other ſide thereof. Thus, let C be the centre of concavity of the mirror A *b* B; and let the parallel rays *d f a*, C *m b*, and *e l c*, fall upon it at the points *a*, *b*, and *c*. Draw the lines C *i a*, C *m b*, and C *h c*, from the centre C to theſe points; and all theſe lines will be perpendicular to the ſurface of the mirror, becauſe they proceed thereto like ſo many radii or ſpokes from its centre. Make the angle C *a b* equal to the angle *d a* C, and draw the line *a m h*, which will be the direction of the ray *d f a*, after it is reflected from the point *a* of the mirror: ſo that the angle of incidence *d a* C, is equal to the angle of reflection C *a b*; the rays making equal angles with the perpendicular C *i a* on its oppoſite ſides.

Draw alſo the perpendicular C *h c* to the point *c*, where the ray *e l c* touches the mirror; and having made the angle C *c i* equal to the angle C *c e*, draw the line *c m i*, which will be the courſe of the ray *e l c*, after it is reflected from the mirror.

The ray C *m b* paſſing thro' the centre of concavity of the mirror, and falling upon it at *b*, is perpendicular to it; and is therefore reflected back from it in the ſame line *b m* C.

All theſe reflected rays meet in the point *m*; and in that point the image of the body which emits the parallel rays *d a*, C *b*, and *e c*, will be formed; which point is diſtant from the mirror equal to half the radius *b m* C of its concavity.

The rays which proceed from any celeſtial object may be eſteemed parallel at the earth; and therefore the images of that object will be formed at *m*, when the reflecting ſurface of the concave mirror is turned directly towards the object. Hence, the focus *m* of parallel rays is not in the centre of the mirror's concavity, but half way between the mirror and that centre.

The rays which proceed from any remote terreſtrial object, are nearly parallel at the mirror: not ſtrictly ſo, but come diverging to it, in ſeparate pencils, or, as it were, bundles of rays, from each point of the ſide of the object next the mirror; and therefore they will not be converged to a point at the diſtance of half the radius of the mirror's concavity from its reflecting ſurface, but into ſeparate points at a little greater diſtance from the mirror. And the nearer the object is to the mirror, the farther theſe points will be from it; and an inverted image of the object will be formed in them, which will ſeem to hang pendant in the air; and will be ſeen by an eye placed beyond it (with regard to the mirror) in all reſpects like the object, and as diſtinct as the object itſelf.

161 Aerial images formed by concave mirrors.

Let A *c* B (fig. 3.) be the reflecting ſurface of a mirror, whoſe centre of concavity is at C; and let the upright object DE be placed beyond the centre C, and ſend out a conical pencil of diverging rays from its upper extremity D, to every point of the concave ſurface of the mirror A *c* B. But to avoid confuſion, we only draw three rays of that pencil, as DA, D *c*, DB.

From the centre of concavity C, draw the three right lines CA, C *c*, CB, touching the mirror in the ſame points where the foreſaid rays touch it; and all theſe lines will be perpendicular to the ſurface of the mirror. Make the angle CA*d* equal to the angle DAC, and draw the right line A *d* for the courſe of the reflected ray DA: make the angle C *c d* equal to the angle D *c* C, and draw the right line *c d* for the courſe of the reflected ray D *d*: make alſo the angle CB *d* equal to the angle DBC, and draw the right line B *d* for the courſe of the reflected ray DB. All theſe reflected rays will meet in the point *d*, where they will form the extremity *d* of the inverted image *e d*, ſimilar to the extremity D of the upright object DE.

If the pencil of rays E *f*, E *g*, E *h*, be alſo continued to the mirror, and their angles of reflection from it be made equal to their angles of incidence upon it, as in the former pencil from D, they will all meet at the point *e* by reflection, and form the extremity *e* of the image *e d*, ſimilar to the extremity E of the object DE.

And as each intermediate point of the object, between D and E, ſends out a pencil of rays in like manner to every part of the mirror, the rays of each pencil will be reflected back from it, and meet in all the intermediate points between the extremities *e* and *d* of the image; and ſo the whole image will be formed, not at *i*, half the diſtance of the mirror from its centre of concavity C; but at a greater diſtance, between *i* and the object DE; and the image will be inverted with reſpect to the object.

This being well underſtood, the reader will eaſily ſee how the image is formed by the large concave mirror of the reflecting teleſcope, when he comes to the deſcription of that inſtrument.

When the object is more remote from the mirror than its centre of concavity C, the image will be leſs than the object, and between the object and mirror: when the object is nearer than the centre of concavity, the image will be more remote and bigger than the object. Thus, if DE be the object, *ed* will be its image: For, as the object recedes from the mirror, the image approaches nearer to it; and as the object approaches nearer to the mirror, the image recedes farther from it; on account of the leſſer or greater divergency of the pencils of rays which proceed from the object: for, the leſs they diverge, the ſooner they are converged to points by reflection; and the more they diverge, the farther they muſt be reflected before they meet.

If the radius of the mirror's concavity, and the diſtance of the object from it, be known, the diſtance of the image from the mirror is found by this rule: Divide the product of the diſtance and radius by double the diſtance made leſs by the radius, and the quotient is the diſtance required.

If the object be in the centre of the mirror's concavity, the image and object will be coincident, and equal in bulk.

If a man places himſelf directly before a large concave mirror, but farther from it than its centre of concavity, he will ſee an inverted image of himſelf in the air, between him and the mirror, of a leſs ſize than himſelf. And if he holds out his hand towards the mirror, the hand of the image will come out towards his hand, and coincide with it, of an equal bulk, when his hand is in the centre of concavity; and he will imagine he may ſhake hands with his image. If he reaches his hand farther, the hand of the image will paſs by his hand, and come between his hand and his body: and if he moves his hand towards either ſide, the hand of the image will move towards the other; ſo that whatever way the object moves, the image will move the contrary.

All the while a byſtander will ſee nothing of the image, becauſe none of the reflected rays that form it enter his eyes.

§ 3. *Microſcopes.*

Plate CCX.

1. *The Single Microſcope* is only a very ſmall globule of glaſs, or a convex lens, whoſe focal diſtance is very ſhort. It is repreſented by *cd*, fig. 6. The object *ab* is placed in its focus, and the eye at the ſame diſtance on the other ſide; ſo that the rays of each pencil, flowing from every point of the object on the ſide next the glaſs; may go on parallel to the eye after paſſing thro' the glaſs; and then, by entering the eye at C, they will be converged to as many points on the retina, and form a large inverted picture AB upon it. The magnifying power of this microſcope is thus explained by Dr Smith. "A minute object *pq*, ſeen diſtinctly through a ſmall glaſs AE by the eye put cloſe to it appears ſo much greater than it would to the naked eye, placed at the leaſt diſtance *q*L from whence it appears ſufficiently diſtinct, as this latter diſtance *q*L is greater than the former *q*E. For having put your eye cloſe to the glaſs EA, in order to ſee as much of the object as poſſible at one view, remove the object *pq* to and fro till it appear moſt diſtinctly, ſuppoſe at the diſtance *Eq*. Then conceiving the glaſs AE to be removed, and a thin plate, with a pin-hole in it, to be put in its place, the object will appear diſtinct, and as large as before, when ſeen through the glaſs, only no ſo bright. And in this laſter caſe it appears ſo much greater than it does to the naked eye at the diſtance *q*L, either with the pin-hole or without it, as the angle *p*E*q* is greater than the angle *p*L*q*, or as the latter diſtance *q*L is greater than the former *q*E. Since the interpoſition of the glaſs has no other effect than to render the appearance diſtinct, by helping the eye to increaſe the refraction of the rays in each pencil, it is plain that the greater apparent magnitude is entirely owing to a nearer view than could be taken by the naked eye. If the eye be ſo perfect as to ſee diſtinctly by pencils of parallel rays falling upon it, the diſtance E*q*, of the object from the glaſs, is then the focal diſtance of the glaſs. Now, if the glaſs be a ſmall round globule, of about $\frac{1}{15}$th of an inch diameter, its focal diſtance E*q*, being three quarters of its diameter, is $\frac{1}{20}$th of an inch; and if *q*L be eight inches, the diſtance at which we uſually view minute objects, this globule will magnify in the proportion of 8 to $\frac{1}{20}$, or of 160 to 1.

Plate CCXVIII. fig. 5. 6.

Plate CCX.

2. *The Double or Compound Microſcope* (fig. 7.) conſiſts of an object-glaſs *cd*, and an eye-glaſs *ef*. The ſmall object *ab* is placed at a little greater diſtance from the glaſs *cd* than its principal focus; ſo that the pencils of rays flowing from the different points of the object, and paſſing through the glaſs, may be made to converge, and unite in as many points between *g* and *h*, where the image of the object will be formed: which image is viewed by the eye through the eye-glaſs *ef*. For the eye-glaſs being ſo placed, that the image *gh* may be in its focus, and the eye much about the ſame diſtance on the other ſide, the rays of each pencil will be parallel after going out of the eye-glaſs, as at *e* and *f*, till they come to the eye at *k*, where they will begin to converge by the refractive power of the humours; and after having croſſed each other in the pupil, and paſſed through the cryſtalline and vitreous humours, they will be collected into points on the retina, and form the large inverted image AB thereon.

162
Uſe of ſeveral lenſes in a compound microſcope.

By this combination of lenſes, the aberration of the light from the figure of the glaſs, which in a globule of the kind abovementioned is very conſiderable, is in ſome meaſure corrected. This appeared ſo ſenſibly to be the caſe, even to former opticians, that they very ſoon began to make the addition of another lens. The inſtrument, however, receives a conſiderable improvement by the addition of a third lens. For, ſays Mr Martin, it is not only evident from the theory of this aberration, that the image of any point is rendered leſs confuſed by refraction through two lenſes, than by an equal refraction through one; but it alſo follows, from the ſame principle, that the ſame point has its image ſtill leſs confuſed when formed by rays refracted through three lenſes, than by an equal refraction through two; and therefore a third lens added to the other two, will contribute to make the image more diſtinct, and conſequently the inſtrument more complete. At the ſame time the field of view is amplified, and the uſe of the microſcope rendered more agreeable, by the addition of the other lens. Thus alſo we may allow a ſomewhat larger aperture to the object-lens, and thereby increaſe the brightneſs of objects, and greatly heighten the pleaſure of viewing them. For the ſame reaſon, Mr Martin has propoſed a four-glaſs microſcope, which anſwers the purpoſes of of magnifying and of diſtinct viſion ſtill more perfectly.

Plate CCXVIII. fig. 7.

The magnifying power of double microſcopes is eaſily underſtood, thus: The glaſs L next the object PQ is very ſmall, and very much convex, and conſequently its focal diſtance LF is very ſhort; the diſtance LQ of the ſmall object PQ is but a little greater than LF: ſo that the image *pq* may be formed at a great diſtance from the glaſs, and conſequently may be much greater than the object itſelf. This picture *pq* being viewed through a convex glaſs AE, whoſe focal diſtance is *q*E, appears diſtinct as in a teleſcope. Now the object appears magnified upon two accounts; firſt, becauſe, if we viewed its picture *pq* with the naked eye, it would appear as much greater than the object, at the ſame diſtance, as it really is greater than the object, or as much as L*q* is greater than LQ: and, ſecondly, becauſe this picture appears magnified through the eye-glaſs as much as the leaſt diſtance at which it can be ſeen diſtinctly with the naked eye, is greater than *q*E, the focal diſtance of the eye-glaſs. For example, if this latter ratio be five to one, and the former ratio of L*q* to LQ be 20 to 1; then, upon both accounts, the object will appear 5 times 20, or 100 times greater than to the naked eye.

Fig. 2. repreſents a compound microſcope with three lenſes. By the middle one GK the pencils of rays coming from the object-glaſs are refracted ſo as to tend to a focus at O; but being intercepted by the proper eye-glaſs DF, they are brought together at I, which is nearer to that lens than its proper focus at L; ſo that the angle DIF, under which the object now appears, is larger than DLF, under which it would have appeared without this additional glaſs; and conſequently the object is more magnified in the ſame proportion. Dr Hooke tells us, that, in moſt of his obſervations, he made uſe of a double microſcope with this broad middle-glaſs when he wanted to ſee much of an object at one view, and taking it out when he would examine the ſmall parts of an object more accurately; for the fewer refractions there are, the more bright and clear the object appears.

163
How to preſerve the diſtinctneſs of objects in different magnifiers.

In microſcopical lenſes whoſe focal diſtances are not much ſhorter than half an inch, there is no need to contract their apertures for procuring diſtinct viſion; the pupil itſelf being ſmall enough to exclude the exterior ſtraggling rays. But in ſmaller lenſes, where apertures are neceſſary, Dr Smith has demonſtrated, that, to preſerve the ſame degree of diſtinctneſs, their apertures muſt be as their focal diſtances, and then the apparent brightneſs will decreaſe in a duplicate ratio of their focal diſtances: ſo that, by uſing ſmaller glaſſes, the apparent magnitude and the obſcurity of the object will both increaſe in the ſame ratio. For the ratio of PD to PF being invariable, the angle PFD is alſo invariable; and conſequently the quantity of light received from the point F is alſo invariable; becauſe the apertures of the lenſes, whether ſmaller or larger, muſt all be ſituated at ſuch diſtances from F as juſt to receive all the rays contained in a cone deſcribed by turning the angle PFD about the axis PF, neither more nor leſs. But the apparent magnitude of the object, or the ſurface of its picture upon the retina, is reciprocally as PF ſquare; and conſequently, the light being the ſame, its brightneſs is directly as PF ſquare. By this theory it appears, that a minute object cannot be magnified to infinity by a ſingle lens, though it were poſſible to make it as ſmall as we pleaſe, without ſome method of increaſing its light. Nevertheleſs, this imperfection in ſingle microſcopes is not ſo great as at firſt ſight one would take it to be, or as in fact we find it; the reaſon may be, becauſe the eye is capable of diſcerning objects tolerably well by above 20,000 different degrees of light. But though the brightneſs of the object were increaſed by throwing new light upon it, yet Huygens obſerves, that the power of the microſcope will ſtill be limited by the breadth of the pencils which enter the pupil; which is equal to the breadth of the aperture. For, if this breadth be leſs than $\frac{1}{5}$ or $\frac{1}{6}$ of a line, he affirms that the edges of the object will begin to appear indiſtinct. But by double microſcopes this author has made it appear, that we may magnify objects at pleaſure, provided it was poſſible to form their object-glaſſes ſufficiently ſmall.

Fig. 3.

Plate CCXVII.

3. *The Solar Microſcope* (fig. 4.), invented by Dr Lieberkuhn, is conſtructed in the following manner. Having procured a very dark room, let a round hole be made in the window-ſhutter, about three inches diameter, through which the ſun may caſt a cylinder of rays AA into the room. In this hole place the end of a tube containing two convex glaſſes and an object, viz. 1. A convex glaſs *aa*, of about two inches diameter, and three inches focal diſtance, is to be placed in that end of the tube which is put into the hole. 2. The object *bb* being put between two glaſſes, which muſt be concave to hold it at liberty, is placed about two inches and a half from the glaſs *aa*. 3. A little more than a quarter of an inch from the object is placed the ſmall convex glaſs *cc*, whoſe focal diſtance is a quarter of an inch. The tube may be ſo placed when the ſun is low, that his rays AA may enter directly into it; but when he is high, his rays BB muſt be reflected into it by the mirror CC. Things being thus prepared, the rays that enter the tube will be conveyed by the glaſs *aa* towards the object *bb*, by which means it will be ſtrongly illuminated, and the rays *d*, which flow from it through the convex lens *cc*, will make a large inverted picture of the object at DD, which, being received on a white paper, will repreſent the object magnified in length, in the proportion of the diſtance of the picture from the glaſs *cc* to the diſtance of the object from the ſame glaſs. Thus, ſuppoſe the diſtance of the object from the glaſs to be

$\frac{3}{10}$ of an inch, and the diſtance of the diſtinct picture to be 12 feet or 144 inches, in which there are 1440 tenth parts of an inch; this number divided by 3 gives 380; which is the number of times that the picture is longer or broader than the object; and the length multiplied by the breadth, ſhews how many times the whole ſurface is magnified.

164
Mr Martin's method of increaſing the light on any object.
Plate CCXVIII. fig. 4.

Mr Martin propoſes the following method of increaſing the light upon objects without heating them too much. Let AB be the frame or plate of the microſcope; CD the hole in the middle, into which the tube is ſcrewed on one ſide, and the illuminating glaſs is on the other: the ſize of this illuminator is commonly $1\frac{1}{2}$ inch diameter; but that not giving ſufficient light, we ſuppoſe it removed, and another much larger lens GH placed at the end of the reflector (or looking-glaſs) EF, moveable upon a foot at F. We may ſuppoſe this glaſs GH to be from three to ſix inches diameter; and therefore, in our example, let it be a lens of 4 inches diameter, and its focal diſtance 12 inches.

Then the looking-glaſs EF being properly adjuſted, and the lens GH ſo poſited as to receive the rays of the ſun *a*, *b*, *c*, in a perpendicular direction, they will be refracted through it, tending towards a focus in the axis IL at 12 inches from the lens. But this cone of rays falling upon the glaſs EF, between K and L, will, by it, be reflected to a focus O in the reflected axis L*g*, which is parallel to the horizon.

Now the focus O of any lens being the image of the ſun, will of courſe be a circle; and in the preſent caſe of a lens 12 inches focal diſtance, this circle will be extremely near $\frac{1}{10}$ of an inch diameter, by allowing 30′ for the diameter of the ſun. Hence the vertex N of the cone will be $\frac{3}{10}$ of an inch beyond the focus O. Therefore the diameter of the ſection of the cone $\frac{3}{10}$ within the focus, will be $\frac{2}{10}$ of an inch; at $\frac{6}{10}$ within the focus, the ſection will be $\frac{3}{10}$; at $\frac{9}{10}$ from the focus, the ſection will be $\frac{4}{10}$; and at $1\frac{2}{10}$ from the focus, the ſection will be $\frac{5}{10}$, or half an inch in diameter.

Therefore at $\frac{3}{20}$ of an inch from the focus the ſection of the cone will be alſo $\frac{3}{20}$ of an inch in diameter; and it is found by experience that nearer the focus O no objects can be placed. Therefore the firſt inch and quarter of the radious cone may be applied for all the various powers of magnifying microſcopic objects; and from thence, through the next inch, the megalaſcope may be applied in the greateſt perfection.

Let Z be the centre of the hole CD in the frame, then ZO will be about $5\frac{1}{2}$ of the 12 inches, and conſequently long enough for a movement of the microſcope and megalaſcope through the 2 inches juſt mentioned. Hence it will appear, that in this conſtruction of the ſolar microſcope, a much leſs apparatus of tube-work will be neceſſary than in the common ſort, where DOC makes all the cone, and the length Z*g* is 7 or 8 inches.

If we put the diameter of the common illuminator CD = 1,5, and the diameter of the lens GH = 3, then, in the ſame ſection RS of the cone produced by each lens ſeparately, we have the intenſity of light as CD^2 to GH^2, that is, as 2,25 to 9, or as 1 to 4. If GH = 4, then the ratio of the increaſe of light will be that of 2,25 to 16, or as 1 to 7,1. Suppoſe GH = 5; then 2,25 : 25 :: 1 : 11 nearly. So that by this conſtruction you may increaſe the light upon objects, or their images, at leaſt ſeven times with eaſe, or ten times with very little trouble or expence.

§ 4. *Teleſcopes.*

I. The Refracting Telescope.

After what has been ſaid concerning the ſtructure of the compound microſcope, and the manner in which the rays paſs through it to the eye, the nature of the common aſtronomical teleſcope will eaſily be underſtood: for it differs from the microſcope only in that the object is placed at ſo great a diſtance from it, that the rays of the ſame pencil, flowing from thence, may be conſidered as falling parallel to one another upon the object-glaſs; and therefore the image made by that glaſs is looked upon as coincident with its focus of parallel rays.

Plate CCXVII.

1. The 6th figure will render this very plain; in which AB is the object emitting the ſeveral pencils of rays A*dc*, B*cd*, &c. but ſuppoſed to be at ſo great a diſtance from the object-glaſs *ed*, that the rays of the ſame pencil may be conſidered as parallel to each other; they are therefore ſuppoſed to be collected into their reſpective foci at the point *m* and *p*, ſituated at the focal diſtance of the object-glaſs *cd*. Here they form an image E, and croſſing each other proceed diverging to the eye-glaſs *hg*; which being placed at its own focal diſtance from the points *m* and *p*, the rays of each pencil, after paſſing through that glaſs, will become parallel among themſelves; but the pencils themſelves will converge conſiderably with reſpect to one another, even ſo as to croſs at *e*, very little farther from the glaſs *gh* than its focus; becauſe, when they entered the glaſs, their axes were almoſt parallel, as coming through the object-glaſs at the point *k*, to whoſe diſtance the breadth of the eye-glaſs in a long teleſcope bears very ſmall proportion. So that the place of the eye will be nearly at the focal diſtance of the eye-glaſs, and the rays of each reſpective pencil being parallel among themſelves, and their axes croſſing each other in a larger angle than they would do if the object were to be ſeen by the naked eye, viſion will be diſtinct, and the object will appear magnified.

The power of magifying in this teleſcope is as the focal length of the object-glaſs to the focal length of the eye-glaſs.

Dem. In order to prove this, we may conſider the angle A*k*B as that under which the object would be ſeen by the naked eye; for in conſidering the diſtance of the object, the length of the teleſcope may be omitted, as bearing no proportion to it. Now the angle under which the object is ſeen by means of the teleſcope, is *geh*, which is to the other A*k*B, or its equal *gkh*, as the diſtance from the centre of the object-glaſs to that of the eye-glaſs. The angle, therefore, under which an object appears to an eye aſſiſted by a teleſcope of this kind, is to that under which it would be ſeen without it, as the focal length of the object-glaſs to the focal length of the eye-glaſs.

It is evident from the figure, that the viſible area, or ſpace which can be ſeen at one view when we look through this teleſcope, depends on the breadth of the eye-glaſs, and not of the object-glaſs; for if the eye-glaſs be too ſmall to receive the rays *gm*, *ph*, the extremities of the object could not have been ſeen at all: a larger breadth of the object-glaſs conduces only to the rendering each point of the image more luminous by receiving a larger pencil of rays from each point of the object.

It is in this teleſcope as in the compound microſcope, where we ſee, when we look through it, not the object itſelf, but only an image of it at CED: now that image being inverted with reſpect to the object, as it is, becauſe the axes of the pencils that flow from the object croſs each other at *k*, objects ſeen through a teleſcope of this kind neceſſarily appear inverted.

This is a circumſtance not at all regarded by aſtronomers: but for viewing objects upon the earth, it is convenient that the teleſcope ſhould repreſent them in their natural poſture; to which uſe the teleſcope with three eye-glaſſes, as repreſented fig. 7. is peculiarly adapted, and the progreſs of the rays through it from the object to the eye is as follows:

Plate CCXVII.

AB is the object ſending out the ſeveral pencils A*cd*, B*cd*, &c. which paſſing through the object-glaſs *cd*, are collected into their reſpective foci in CD, where they form an inverted image. From hence they proceed to the firſt eye-glaſs *ef*, whoſe focus being at *l*, the rays of each pencil are rendered parallel among themſelves, and their axes, which were nearly parallel before, are made to converge and croſs each other: the ſecond eye-glaſs *gh*, being ſo placed that its focus ſhall fall upon *m*, renders the axis of the pencils which diverge from thence parallel, and cauſes the rays of each which were parallel among themſelves to meet again at its focus EF on the other ſide, where they form a ſecond image inverted with reſpect to the former, but erect with reſpect to the object. Now this image being ſeen by the eye at *ab* through the eye-glaſs *ik*, affords a direct repreſentation of the object, and under the ſame angle that the firſt image CD would have appeared, had the eye been placed at *l*, ſuppoſing the eye-glaſſes to be of equal convexity; and therefore the object is ſeen equally magnified in this as in the former teleſcope, that is, as the focal diſtance of the object-glaſs to that of any one of the eye-glaſſes, and appears erect.

If a teleſcope exceeds 20 feet, it is of no uſe in viewing objects upon the ſurface of the earth; for if it magnifies above 90 or 100 times, as thoſe of that length uſually do, the vapours, which continually float near the earth in great plenty, will be ſo magnified as to render viſion obſcure.

2. *The Galilean Teleſcope* with the concave eye-glaſs is conſtructed as follows:

AB (fig. 5.) is an object ſending forth the pencils of rays *ghi*, *klm*, &c. which, after paſſing through the object-glaſs *cd*, tend towards *e*E*f* (where we will ſuppoſe the focus of it to be), in order to form an inverted image there as before; but in their way to it are made to paſs through the concave glaſs *no*, ſo placed that its focus may fall upon E, and conſequently the rays of the ſeveral pencils which were converging towards thoſe reſpective focal points *e*, E, *f*, will be rendered parallel among themſelves; but the axes of thoſe pencils croſſing each other at F, and diverging from thence, will be rendered more diverging, as repreſented in the figure. Now theſe rays entering the pupil of an eye, will form a large and diſtinct image *ab* upon the retina, which will be inverted with reſpect to the object, becauſe the axes of the pencils croſs in F; and the angle the object will appear under will be equal to that which the lines *a*F, *b*F, produced back through the eye-glaſs, form at F.

It is evident, that the leſs the pupil of the eye is, the leſs is the viſible area ſeen through a teleſcope of this kind; for a leſs pupil would exclude ſuch pencils as proceed from the extremities of the object AB, as is evident from the figure. This is an inconvenience that renders this teleſcope unfit for many uſes; and is only to be remedied by the teleſcope with the convex eye-glaſſes, where the rays which form the extreme parts of the image are brought together in order to enter the pupil of the eye, as explained above.

It is apparent alſo, that the nearer the eye is placed to the eye-glaſs of this teleſcope, the larger is the area ſeen through it; for, being placed cloſe to the glaſs, as in the figure, it admits rays that come from A and B, the extremities of the object, which it could not if it was placed farther off.

The degree of magnifying in this teleſcope is in the ſame proportion with that in the other, *viz.* as the focal diſtance of the object-glaſs is to the focal-diſtance of the eye-glaſs.

For there is no other difference but this, *viz.* that as the extreme pencils in that teleſcope were made to converge and form the angle *geh* (fig. 6.), or *ink* (fig. 7.), theſe are now made to diverge and form the angle *a*F*b* (fig. 5.); which angles, if the concave glaſs in one has an equal refractive power with the convex one in the other, will be equal, and therefore each kind will exhibit the object magnified in the ſame degree.

165 Imperfection in dioptrical teleſcopes.

There is a defect in all theſe kinds of teleſcopes, not to be remedied in a ſingle lens by any means whatever, which was thought only to ariſe from hence, viz. that ſpherical glaſſes do not collect rays to one and the ſame point. But it was happily diſcovered by Sir Iſaac Newton, that the imperfection of this ſort of teleſcope, ſo far as it ariſes from the ſpherical form of the glaſſes, bears almoſt no proportion to that which is owing to the different refrangibility of light. This diverſity in the refraction of rays is about a 28th part of the whole; ſo that the object-glaſs of a teleſcope cannot collect the rays which flow from any one point in the object into a leſs room than the circular ſpace whoſe diameter is about the 56th part of the breadth of the glaſs (A). Therefore, ſince each

---

Plate CCXVII.

(A) To ſhew this, let AB, fig. 1. repreſent a convex lens, and let CDF be a pencil of rays flowing from the point D: let H be the point at which the leaſt refrangible rays are collected to a focus; and I, that where the moſt refrangible concur. Then, if IH be the 28th part of EH, IK will be a proportionable part of EC (the triangles HIK and HEC being ſimilar): conſequently LK will be the 28th part of FC. But MN will be the leaſt ſpace into which the rays will be collected, as appears by their progreſs repreſented in the figure. Now MN is but about half of KL; and therefore it is about the 56th part of CF: ſo that the diameter of the ſpace, into which the rays are collected, will be about the 56th part of the breadth of that part of the glaſs thro' which the rays paſs. Which was to be ſhewn.

each point of the object will be repreſented in ſo large a ſpace, and the centres of thoſe ſpaces will be contiguous, becauſe the points in the object the rays flow from are ſo; it is evident, that the image of an object made by ſuch a glaſs muſt be a moſt confuſed repreſentation, though it does not appear ſo when viewed through an eye-glaſs that magnifies in a moderate degree; conſequently the degree of magnifying in the eye-glaſs muſt not be too great with reſpect to that of the object-glaſs, leſt the confuſion become ſenſible.

Notwithſtanding this imperfection, a dioptrical teleſcope may be made to magnify in any given degree, provided it be of ſufficient length; for the greater the focal diſtance of the object-glaſs is, the leſs may be the proportion which the focal diſtance of the eye-glaſs may bear to that of the object-glaſs, without rendering the image obſcure. Thus, an object-glaſs, whoſe focal diſtance is about four feet, will admit of an eye-glaſs whoſe focal diſtance ſhall be little more than an inch, and conſequently will magnify almoſt 48 times: but an object-glaſs of 40 foot focus will admit of an eye-glaſs of only four-inch focus, and will therefore magnify 120 times; and an object-glaſs of 100 foot focus will admit of an eye-glaſs of little more than ſix-inch focus, and will therefore magnify almoſt 200 times.

The reaſon of this diſproportion in their ſeveral degrees of magnifying is to be explained in the following manner. Since the diameter of the ſpaces, into which rays flowing from the ſeveral points of an object are collected, are as the breadth of the object-glaſs, it is evident that the degree of confuſedneſs in the image is as the breadth of that glaſs; for the degree of confuſedneſs will only be as the diameters or breadths of thoſe ſpaces, and not as the ſpaces themſelves. Now the focal length of the eye-glaſs, that is, its power of magnifying, muſt be as that degree; for, if it exceeds it, it will render the confuſedneſs ſenſible; and therefore it muſt be as the breadth or diameter of the object-glaſs. The diameter of the object-glaſs, which is as the ſquare root of its aperture or magnitude, muſt be as the ſquare-root of the power of magnifying in the teleſcope; for unleſs the aperture itſelf be as the power of magnifying, the image will want light: the ſquare root of the power of magnifying will be as the ſquare root of the focal diſtance of the object-glaſs; and therefore the focal diſtance of the eye-glaſs muſt be only as the ſquare root of that of the object-glaſs. So that in making uſe of an object-glaſs of a longer focus, ſuppoſe, than one that is given, you are not obliged to apply an eye-glaſs of a proportionably longer focus than what would ſuit the given object-glaſs, but ſuch an one only whoſe focal diſtance ſhall be to the focal diſtance of that which will ſuit the given object-glaſs, as the ſquare root of the focal length of the object-glaſs you make uſe of, is to the ſquare root of the focal length of the given one. And this is the reaſon that longer teleſcopes are capable of magnifying in a greater degree than ſhorter ones, without rendering the object confuſed or coloured.

166
ow reme-
ed by Mr
ollond.

3. *Dollond's Teleſcopes*.—The general principle on which this artiſt's celebrated improvement of the refracting teleſcope depends, hath been already mentioned; namely, that by the different powers of refraction in two kinds of glaſs, and by their different powers of diſperſing the rays, the errors ariſing from the different refrangibility of the light are in a great meaſure, if not totally, corrected.—For this purpoſe the object-glaſſes of his teleſcopes are compoſed of three diſtinct lenſes, two convex and one concave; of which the concave one is placed in the middle, as is repreſented in fig. 6. where *a* and *c* ſhew the two convex lenſes, and *b b* the concave one, which is by the Britiſh artiſts placed in the middle. The two convex ones are made of green glaſs, and the middle one of white flint glaſs, and are all ground to ſpheres of the ſame radius. When put together, they refract the rays in the following manner. Let *a b*, *ab*, be two red rays of the ſun's light falling parallel on the firſt green convex lens *c*. Suppoſing there was no other lens preſent but that one, they would then be converged into the lines *b e*, *b e*, and at laſt meet in the focus *q*. Let the lines *g h*, *g h*, repreſent two violet rays falling on the ſurface of the lens. Theſe are alſo refracted, and will meet in a focus; but as they have a greater degree of refrangibility than the red rays, they muſt, of conſequence, converge more by the ſame power of refraction in the glaſs, and meet ſooner in a focus, ſuppoſe at *r*.—Let now the concave lens *d d* be placed in ſuch a manner as to intercept all the rays before they come to their focus. As this lens is ground to the ſame radius with the convex one, it muſt have the ſame power to cauſe the rays diverge that the former had to make them converge; that is, ſuppoſing them both to be made of the ſame materials. In this caſe, the red rays would become parallel, and move on in the line *o o*, *o o*: But the concave lens, being made of white glaſs, has a greater refractive power, and therefore they diverge a little after they come out of it; and if no third lens was interpoſed, they would proceed diverging in the lines *o p t*, *o p t*; but, by the interpoſition of the third lens *o v o*, they are again made to converge, and meet in a focus ſomewhat more diſtant than the former, as at *x*. By the concave lens the violet rays are alſo refracted, and made to diverge: but having a greater degree of refrangibility, the ſame power of refraction makes them diverge ſomewhat more than the red ones; and thus, if no third lens was interpoſed, they would proceed in ſuch lines as *l m n*, *l m n*. Now as the differently coloured rays fall upon the third lens with different degrees of divergence, it is plain, that the ſame power of refraction in that lens will operate upon them in ſuch a manner as to bring them all together to a focus very nearly at the ſame point. The red rays, it is true, require the greateſt power of refraction to bring them to a focus; but they fall upon the lens with the leaſt degree of divergence. The violet rays, though they require the leaſt power of refraction, yet have the greateſt degree of divergence; and thus all meet together at the point *x*, or very nearly ſo.

Plate CCXVI.

Fig. 7.

But, though we have hitherto ſuppoſed the refraction of the concave lens to be greater than that of the convex ones, it is eaſy to ſee how the errors occaſioned by the firſt lens may be corrected by it, though it ſhould have even a leſs power of refraction than the convex one. Thus, let *a b*, *a b*, fig. 8. be two rays of red light falling upon the convex lens *c*, and refracted into the focus *q*; let alſo *g h*, *g h*, be two violet rays converged into a focus at *r*; it is not neceſſary, in order to their convergence into a common focus at *x*, that the concave lens ſhould make them *diverge:* it is ſufficient if the glaſs has a power of diſperſing the violet rays ſomewhat more than the red ones; and many kinds of glaſs have this power of diſperſing ſome kinds of rays, without a very great power of refraction. It is better, however, to have the object-glaſs compoſed of three lenſes; becauſe there is then another correction of the aberration by means of the third lens; and it might be impoſſible to find two lenſes, the errors of which would exactly correct each other. It is alſo eaſy to ſee, that the effect may be the ſame whether the concave glaſs is a portion of the ſame ſphere with the others or not; the effect depending upon a combination of certain circumſtances, of which there is an infinite variety.

By means of this correction of the errors ariſing from the different refrangibility of the rays of light, it is poſſible to ſhorten dioptric teleſcopes conſiderably, and yet leave them equal magnifying powers. The reaſon of this is, that the errors ariſing from the object-glaſs being removed, thoſe which are occaſioned by the eye-glaſs are inconſiderable: for the error is always in proportion to the length of the focus in any glaſs; and in very long teleſcopes it becomes exceedingly great, being no leſs than $\frac{1}{28}$ of the whole; but in glaſſes of a few inches focus it becomes trifling. Refracting teleſcopes which go by the name of *Dollond's*, are therefore now conſtructed in the following manner. Let AB (fig. 1.) repreſent an object-glaſs compoſed of three lenſes as above deſcribed, and converging the rays 1, 2, 3, 4, &c. to a very diſtant focus as at *x*. By means of the interpoſed lens CD, however, they are converged to one much nearer, as at *y*, where an image of the object is formed. The rays diverging from thence fall upon another lens EF, where the pencils are rendered parallel, and an eye placed near that lens would ſee the object magnified and very diſtinct. To enlarge the magnifying power ſtill more, however, the pencils thus become parallel are made to fall upon another at GH; by which they are again made to converge to a diſtant focus: but, being intercepted by the lens IK, they are made to meet at the nearer one *z*; whence diverging to LM, they are again rendered parallel, and the eye at N ſees the object very diſtinctly.

Plate CCXVIII.

From an inſpection of the figure it is evident, that Dollond's teleſcope thus conſtructed is in fact two teleſcopes combined together; the firſt ending with the lens EF, and the ſecond with LM. In the firſt we do not perceive the object itſelf, but the image of it formed at *y*; and in the ſecond we perceive only the image of that image formed at *z*. Nevertheleſs ſuch teleſcopes are exceedingly diſtinct, and repreſent objects ſo clearly as to be preferred, in viewing terreſtrial things, even to reflectors themſelves. The latter indeed have greatly the advantage in their powers of magnifying, but they are much deficient in point of light. Much more light is loſt by reflection than by refraction: and as in theſe teleſcopes the light muſt unavoidably ſuffer two reflections, a great deal of it is loſt; nor is this loſs counterbalanced by the greater aperture which theſe teleſcopes will bear, which enables them to receive a greater quantity of light than the refracting ones. The metals of reflecting teleſcopes alſo are very much ſubject to tarniſh, and require much more dexterity to clean them than the glaſſes of refractors; which makes them more troubleſome and expenſive, though for making diſcoveries in the celeſtial regions they are undoubtedly the only proper inſtruments.

II. The REFLECTING TELESCOPE.

1. *Of Sir Iſaac Newton's Reflecting Teleſcope.* The inconveniences ariſing from the great length of refracting teleſcopes are ſufficiently obvious; and theſe, together with the difficulties ariſing from the different refrangibility of light, induced Sir Iſaac Newton to give attention to the ſubject of reflection, and endeavour to realize the ideas of himſelf and others concerning the poſſibility of conſtructing teleſcopes upon this principle. The inſtrument he contrived is repreſented fig. 9. where ABCD is the tube, BC a concave reflecting metal, EF a plain reflecting metal fixed to the tube by means of the ſtem HI. MN repreſents a diſtant object emitting pencils of rays from each point, two only of which are here repreſented, and thoſe cut off before they reach the metal, to prevent confuſion in the figure. Now it is evident from what has been explained above, that theſe rays, were they not intercepted in their way, would return after reflection at the concave ſurface BC, and form an inverted image at OP, ſuppoſing that to be the place of the focus of reflected rays. But in this caſe the reflected rays are intercepted in their return to that place by the plain metal, and are thereby thrown ſidewiſe; and inſtead of forming the image OP, are made to form the image QR: which, becauſe the rays have as yet ſuffered no refraction, is not liable to the imperfection which ariſes from the different refrangibility of the rays of light, nor to any other except what may ariſe from an imperfect poliſh, or the want of the form of one of the conic ſections in the reflector BC; and therefore may be viewed by an eye at T with a very ſmall lens or eye-glaſs KL, without appearing either coloured or confuſed.

Plate CCXVI.

2. *The Gregorian teleſcope.* This remedies the inconvenience of the Newtonian one, by which objects are found with difficulty. This defect, indeed, was in ſome meaſure removed by having a ſmall refracting teleſcope with two hairs, or wires, running thro' the tube in the common focus of the two glaſſes, and croſſing each other at right angles; and the object being firſt viewed through this ſmall teleſcope was afterwards eaſily found by the reflector. But the inconvenience is more effectually remedied by the following conſtruction.

Plate CCXVII.

At the bottom of the great tube TTTT (fig. 8.) is placed the large concave mirror DUVF, whoſe principal focus is at *m*; and in its middle is a round hole P, oppoſite to which is placed the ſmall mirror L, concave toward the great one; and ſo fixed to a ſtrong wire M, that it may be moved farther from the great mirror, or nearer to it, by means of a long ſcrew on the outſide of the tube, keeping its axis ſtill in the ſame line P*mn* with that of the great one. Now, ſince in viewing a very remote object, we can ſcarce ſee a point of it but what is at leaſt as broad as the great mirror, we may conſider the rays of each pencil, which flow from every point of the object, to be parallel to each other, and to cover the whole reflecting ſurface DUVF. But to avoid confuſion in the figure, we ſhall only draw two rays of a pencil flowing from each extremity of the object into the great tube, and trace their progreſs, through all their reflections and refractions, to the eye f, at the end of the ſmall tube tt, which is joined to the great one.

Let us then ſuppoſe the object AB to be at ſuch a diſtance, that the rays C may flow from its lower extremity B, and the rays E from its upper extremity A. Then the rays C falling parallel upon the great mirror at D, will be thence reflected converging, in the direction DG; and by croſſing at I, in the principal focus of the mirror, they will form the upper extremity I of the inverted image IK, ſimilar to the lower extremity B of the object AB: and paſſing on to the concave mirror L (whoſe focus is at n) they will fall upon it at g, and be thence reflected converging, in the direction gN, becauſe gm is longer than gn; and paſſing through the hole P in the large mirror, they would meet ſomewhere about r, and form the lower extremity D of the erect image ad, ſimilar to the lower extremity B of the object AB. But by paſſing through the plano-convex glaſs R in their way, they form that extremity of the image at b. In like manner, the rays E, which come from the top of the object AB, and fall parallel upon the great mirror at F, are thence reflected converging to its focus, where they form the lower extremity K of the inverted image IK, ſimilar to the upper extremity A of the object AB; and thence paſſing on to the ſmall mirror L, and falling upon it at h, they are thence reflected in the converging ſtate hO; and going on through the hole P of the great mirror, they would meet ſomewhere about q, and form there the upper extremity a of the erect image ad, ſimilar to the upper extremity A of the object AB: but by paſſing through the convex glaſs R in their way, they meet and croſs ſooner, as at a, where the point of the erect image is formed. The like being underſtood of all thoſe rays which flow from the intermediate points of the object between A and B, and enter the tube TT, all the intermediate points of the image between a and b will be formed; and the rays paſſing on from the image, through the eye-glaſs S, and through a ſmall hole e in the end of the leſſer tube tt, they enter the eye f, (which ſees the image ab by means of the eye-glaſs) under the large angle ced, and magnified in length under that angle from c to d.

In the beſt reflecting teleſcopes, the focus of the ſmall mirror is never coincident with the focus m of the great one, where the firſt image IK is formed, but a little beyond it (with reſpect to the eye), as at n: the conſequence of which is, that the rays of the pencils will not be parallel after reflection from the ſmall mirror, but converge ſo as to meet in points about q, e, r; where they would form a larger upright image than ab, if the glaſs R was not in their way; and this image might be viewed by means of a ſingle eye-glaſs properly placed between the image and the eye: but then the field of view would be leſs, and conſequently not ſo pleaſant; for which reaſon, the glaſs R is ſtill retained, to enlarge the ſcope or area of the field.

To find the magnifying power of this teleſcope, multiply the focal diſtance of the great mirror by the diſtance of the ſmall mirror from the image next the eye, and multiply the focal diſtance of the ſmall mirror by the focal diſtance of the eye-glaſs; then divide the product of the former multiplication by the product of the latter, and the quotient will expreſs the magnifying power.

One great advantage of the reflecting teleſcope is, that it will admit of an eye-glaſs of a much ſhorter focal diſtance than a refracting teleſcope will; and, conſequently, it will magnify ſo much the more: for the rays are not coloured by reflection from a concave mirror, if it be ground to a true figure, as they are by paſſing through a convex-glaſs, let it be ground ever ſo true.

The adjuſting ſcrew on the outſide of the great tube fits this teleſcope to all ſorts of eyes, by bringing the ſmall mirror either nearer to the eye, or removing it farther; by which means the rays are made to diverge a little for ſhort-ſighted eyes, or to converge for thoſe of a long ſight.

The nearer an object is to the teleſcope, the more its pencils of rays will diverge before they fall upon the great mirror, and therefore they will be the longer of meeting in points after reflection; ſo that the firſt image IK will be formed at a greater diſtance from the large mirror, when the object is near the teleſcope, than when it is very remote. But as this image muſt be formed farther from the ſmall mirror than its principal focus n, this mirror muſt be always ſet at a greater diſtance from the large one, in viewing near objects, than in viewing remote ones. And this is done by turning the ſcrew on the outſide of the tube, until the ſmall mirror be ſo adjuſted, that the object (or rather its image) appears perfect.

In looking through any teleſcope towards an object, we never ſee the object itſelf, but only that image of it which is formed next the eye in the teleſcope. For if a man holds his finger or a ſtick between his bare eye and an object, it will hide part (if not the whole) of the object from his view. But if he ties a ſtick acroſs the mouth of a teleſcope before the object-glaſs, it will hide no part of the imaginary object he ſaw through the teleſcope before, unleſs it covers the whole mouth of the tube: for all the effect will be, to make the object appear dimmer, becauſe it intercepts part of the rays. Whereas, if he puts only a piece of wire acroſs the inſide of the tube, between the eye-glaſs and his eye, it will hide part of the object which he thinks he ſees: which proves, that he ſees not the real object, but its image. This is alſo confirmed by means of the ſmall mirror L, in the reflecting teleſcope, which is made of opake metal, and ſtands directly between the eye and the object towards which the teleſcope is turned; and will hide the whole object from the eye at e, if the two glaſſes R and S are taken out of the tube.

§ 5. *Camera Obſcura.*

The camera obſcura is made by a convex-glaſs CD (fig. 2.) placed in a hole of a window-ſhutter. Then if the room be darkened, ſo as no light can enter but what comes thro' the glaſs, the pictures of all the objects (as fields, trees, buildings, men, cattle,

Plate CCXVI.

cattle, &c.) on the outſide, will be ſhewn in an inverted order, on a white paper placed at GH in the focus of the glaſs; and will afford a moſt beautiful and perfect piece of perſpective or landſcape of whatever is before the glaſs, eſpecially if the ſun ſhines upon the objects.

If the convex-glaſs CD be placed in a tube in the ſide of a ſquare box, within which is the plane mirror EF, reclining backwards in an angle of 45 degrees from the perpendicular kq, the pencils of rays flowing from the outward objects, and paſſing thro' the convex glaſs to the plane mirror, will be reflected upwards from it, and meet in points, as I and K (at the ſame diſtance that they would have met at H and G, if the mirror had not been in the way,) and will form the aforeſaid images on an oiled paper ſtretched horizontally in the direction IK: on which paper the outlines of the images may be eaſily drawn with a black-lead pencil; and then copied on a clean ſheet, and coloured by art, as the objects themſelves are by nature.—In this machine, it is uſual to place a plane glaſs, unpoliſhed, in the horizontal ſituation IK, which glaſs receives the images of the outward objects; and their outlines may be traced upon it by a black-lead pencil.

Plate CCXVI. fig. 2.

N. B. The tube in which the convex-glaſs CD is fixed, muſt be made to draw out, or puſh in, ſo as to adjuſt the diſtance of that glaſs from the plane mirror, in proportion to the diſtance of the outward objects; which the operator does, until he ſees their images diſtinctly painted on the horizontal glaſs at IK.

The forming a horizontal image, as IK, of an upright object AB, depends upon the angles of incidence of the rays upon the plane mirror EF, being equal to their angles of reflection from it. For, if a perpendicular be ſuppoſed to be drawn to the ſurface of the plane mirror at e, where the ray AaCe falls upon it, that ray will be reflected upwards in an equal angle with the other ſide of the perpendicular, in the line edI. Again, if a perpendicular be drawn to the mirror from the point f, where the ray Abf falls upon it, that ray will be reflected in an equal angle from the other ſide of the perpendicular, in the line fhI. And if a perpendicular be drawn from the point g, where the ray Acg falls upon the mirror, that ray will be reflected in an equal angle from the other ſide of the perpendicular, in the line giI. So that all the rays of the pencil abc, flowing from the upper extremity of the object AB, and paſſing thro' the convex glaſs CD, to the plane mirror EF, will be reflected from the mirror, and meet at I, where they will form the extremity I of the image IK, ſimilar to the extremity A of the object AB. The like is to be underſtood of the pencil qrs, flowing from the lower extremity of the object AB, and meeting at K (after reflection from the plane mirror) the rays form the extremity K of the image, ſimilar to the extremity B of the object: and ſo of all the pencils that flow from the intermediate points of the object to the mirror, thro' the convex glaſs.

If a convex glaſs, of a ſhort focal diſtance, be placed near the plane mirror in the end of a ſhort tube, and a convex glaſs be placed in a hole in the ſide of the tube, ſo as the image may be formed between the laſt-mentioned convex glaſs and the plane mirror; the image being viewed thro' this glaſs, will appear magnified.—In this manner, the *Opera-glaſſes* are conſtructed; with which a gentleman may look at any lady at a diſtance in the company, and the lady know nothing of it.

§ 6. *Magic Lantern.*

ABCD (fig. 5.) is a tin lantern, with a tube $nklm$ fixed in the ſide of it. This tube conſiſts of two joints, one of which ſlips into the other: and by drawing this joint out, or puſhing it in, the tube may be made longer or ſhorter. At kl, in the end of the moveable joint of the tube, a convex lens is fixed; and an object painted with tranſparent colours upon a piece of thin glaſs is placed at de, ſomewhere in the immoveable joint of the tube; ſo that as the tube is lengthened or ſhortened, the lens will be either at a greater or a leſs diſtance from this tranſparent object. In the ſide of the lantern there is a very convex lens bhc, which ſerves to caſt a very ſtrong light from the candle within the lantern upon the object de. Now when the rays, which ſhine through the object de, diverge from the ſeveral points as d, e, &c. in the object, and fall upon the lens kl, they will be made to converge to as many points f, g, &c. on the other ſide of the lens, and will paint an inverted picture of the object at fg upon a white wall, a ſheet, or a ſcreen of white paper, provided the object is farther from the lens than its principal focus. To make this picture appear diſtinct and bright, it muſt have no other light fall upon it but what comes through the lens kl; and for this reaſon the whole apparatus is to be placed in a dark room EFGH. The lens kl muſt be very convex, ſo that the object de may be very near to it, and yet not be nearer than its principal focus: for by this means, as the object is near to the lens, the picture fg will be at a great diſtance from it, and conſequently the picture will be much bigger than the object. Since the picture is inverted in reſpect of the object, in order to make the picture appear with the right end upwards, it is neceſſary that the object de ſhould be placed with the wrong end upwards.

SECT. V. *A Deſcription of the above and other Optical Inſtruments, fitted with their Apparatus; with an account of the methods of applying them to the purpoſes for which they are intended.*

§ 1. *Camera Obſcura and Magic Lantern.*

See DIOPTRICS, p. 2477 to p. 2482.

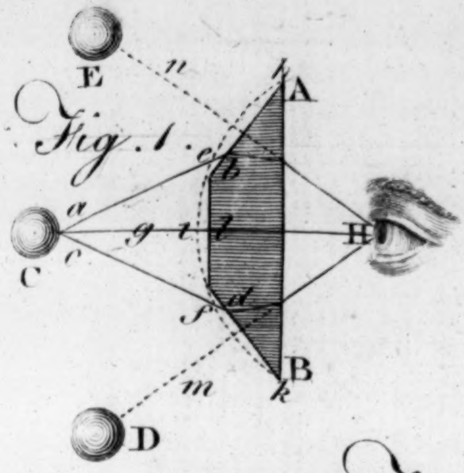
§ 2. *The Graphical Perſpective.*

THIS inſtrument conſiſts of two lenſes AB and CD, fig. 1. which are placed at twice their focal diſtance from one another; and in their common focus is another glaſs EF, divided into equal parts with the point of a diamond. Though this inſtrument does not magnify objects, yet the angle under which any object is ſeen is eaſily known by it; and ſince this angle varies with the diſtance of objects, it is eaſily applied to the purpoſe of meaſuring inacceſſible heights and diſtances;

Plate CCXIX.

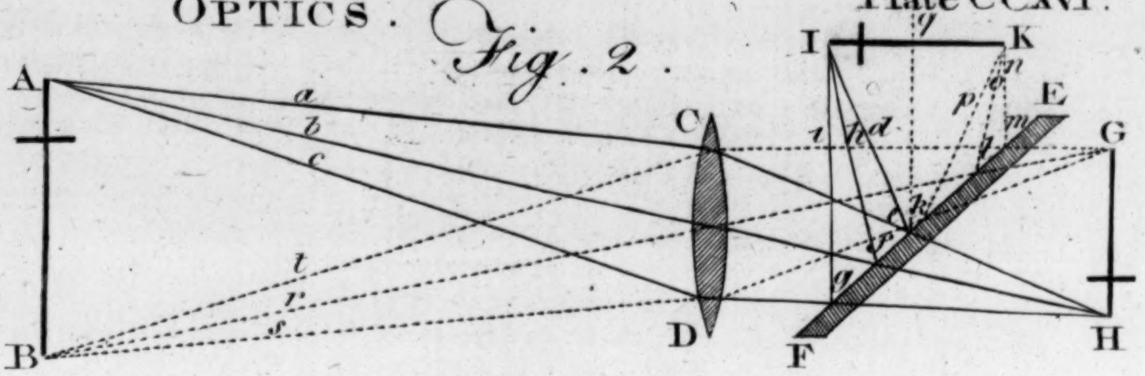
OPTICS. Plate CCXVI.

Fig. 1.



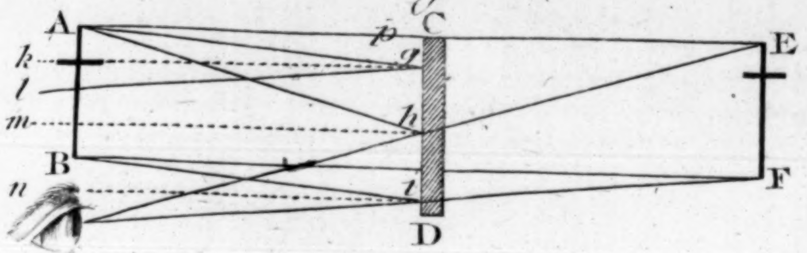
E
n
h
A
a
b
C
c
g
i
H
f
d
B
m
k
D

Fig. 2.



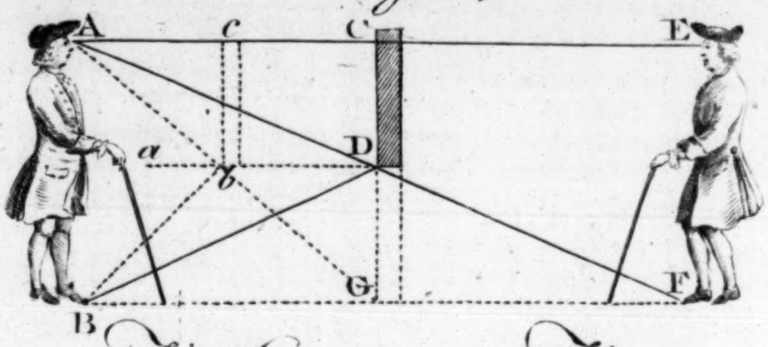
A
a
b
c
t
r
s
B
C
D
I
q
K
E
G
H
F

Fig. 3



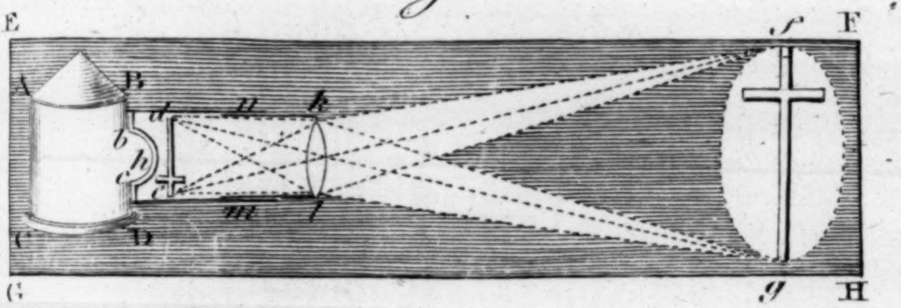
A
k
l
m
B
n
p
C
g
h
i
D
E
F

Fig. 4.



A
c
C
E
a
b
D
G
B
F

Fig. 5.



E
A
B
F
f
n
k
m
l
C
D
G
g
H

Fig. 6.

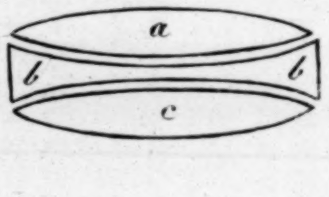
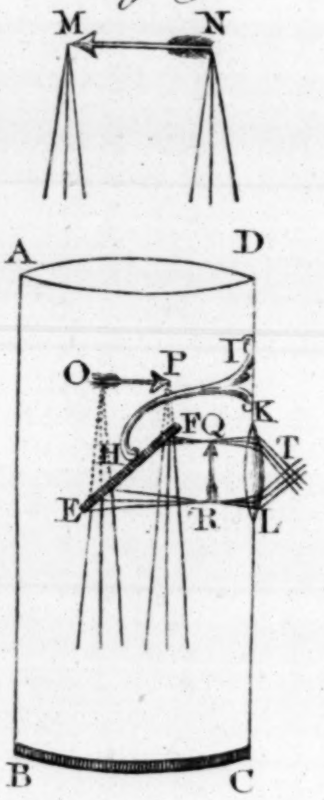
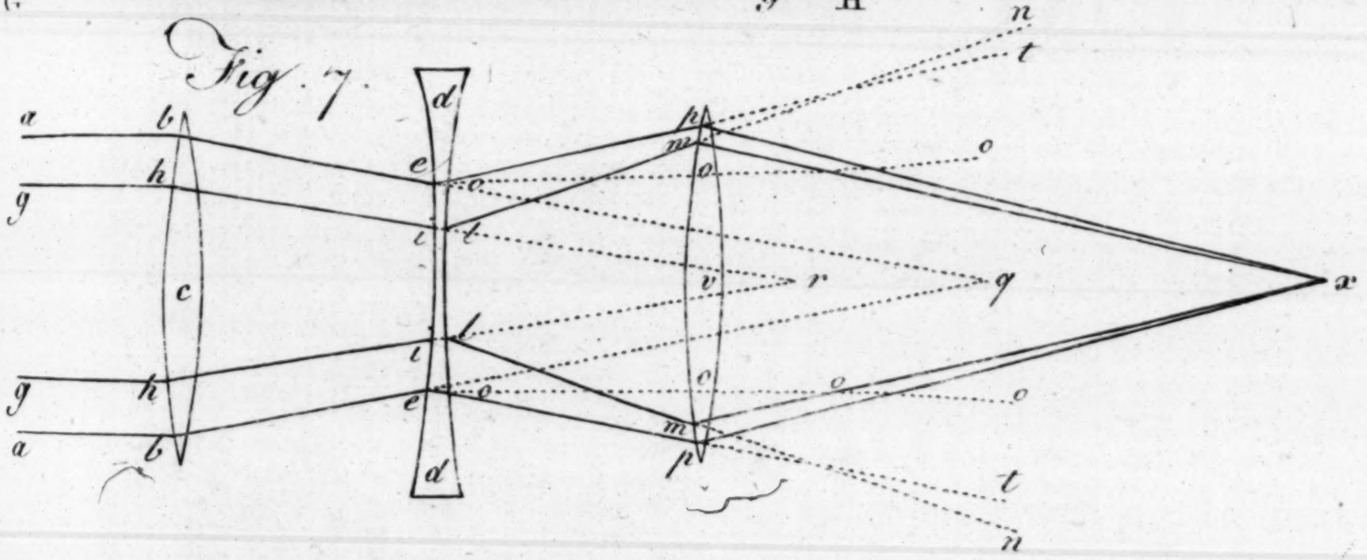


Fig. 9.



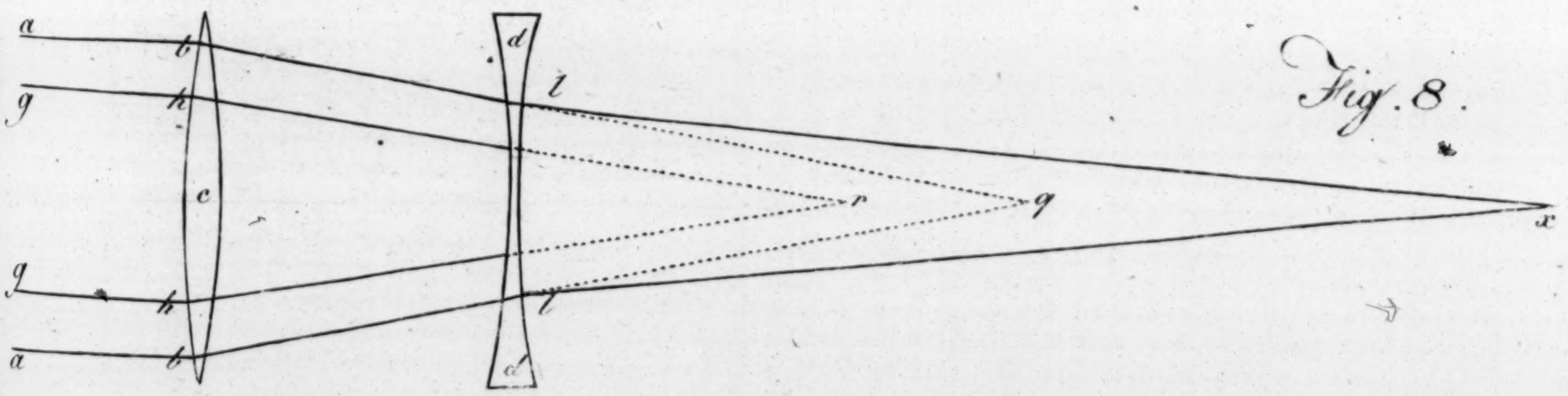
M
N
A
D
O
P
I
K
F
Q
T
H
E
R
L
B
C

Fig. 7



a
g
g
a
b
h
c
h
b
d
e
i
i
e
d
p
m
o
v
r
q
x
n
t
o
t
n

Fig. 8.



a
g
g
a
b
h
c
h
b
d
l
l
d
r
q
x

A Bell Sculp.

3 MA 53

Fig. 1.

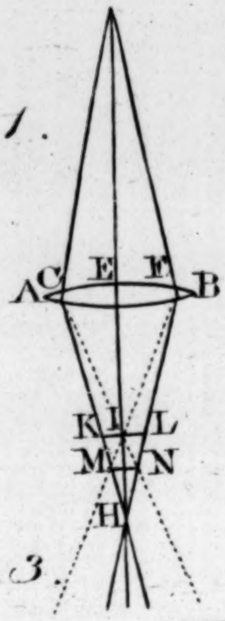

A
C
E
F
B
K
I
L
M
N
H

Fig. 2.

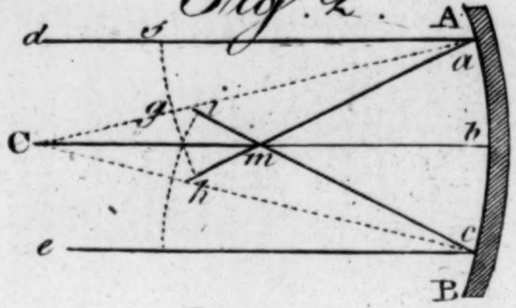

d
s
A
a
g
i
C
m
b
h
c
e
B

Fig. 4.

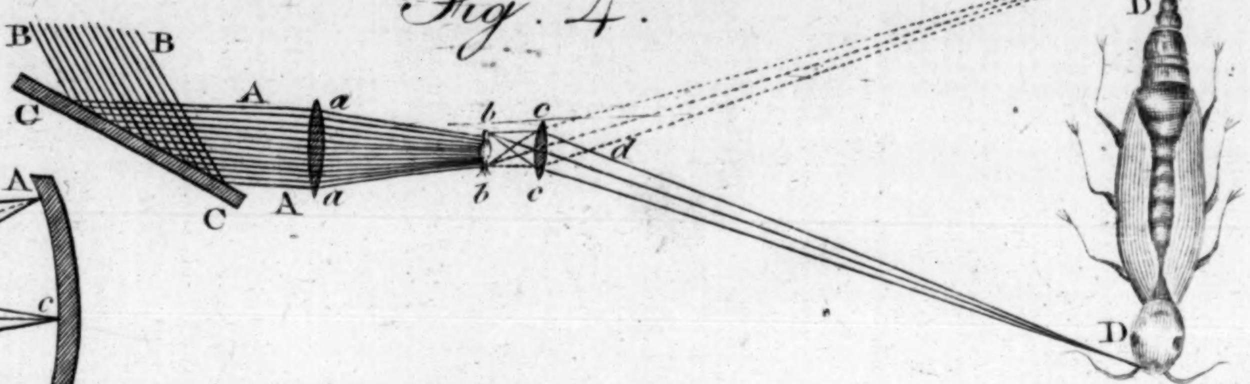

B
B
C
A
a
b
c
d
D
C
A
a
b
c
D

Fig. 3.

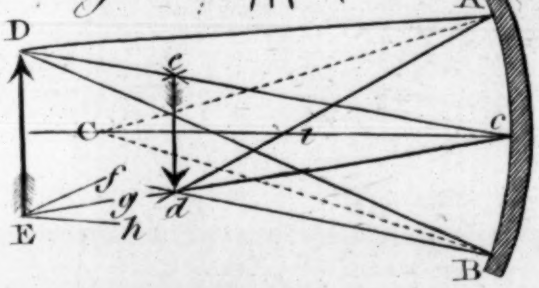

D
A
e
C
l
c
E
f
g
h
d
B

Fig. 5.

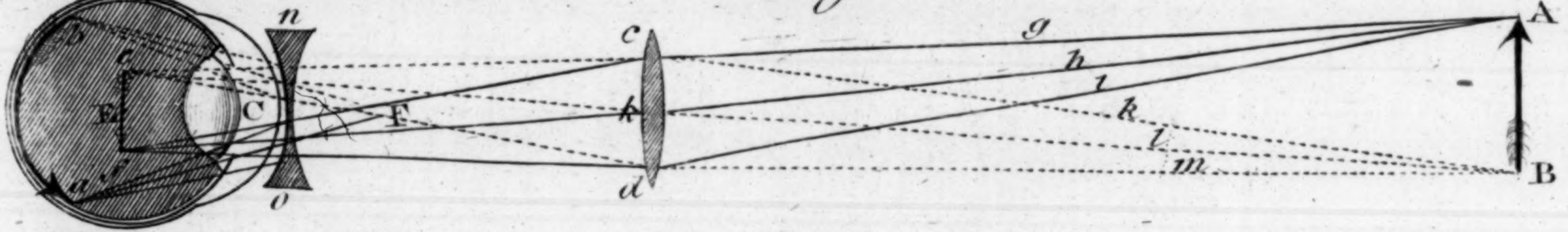

n
c
g
A
h
i
E
C
F
k
k
l
m
d
o
B

Fig. 6.

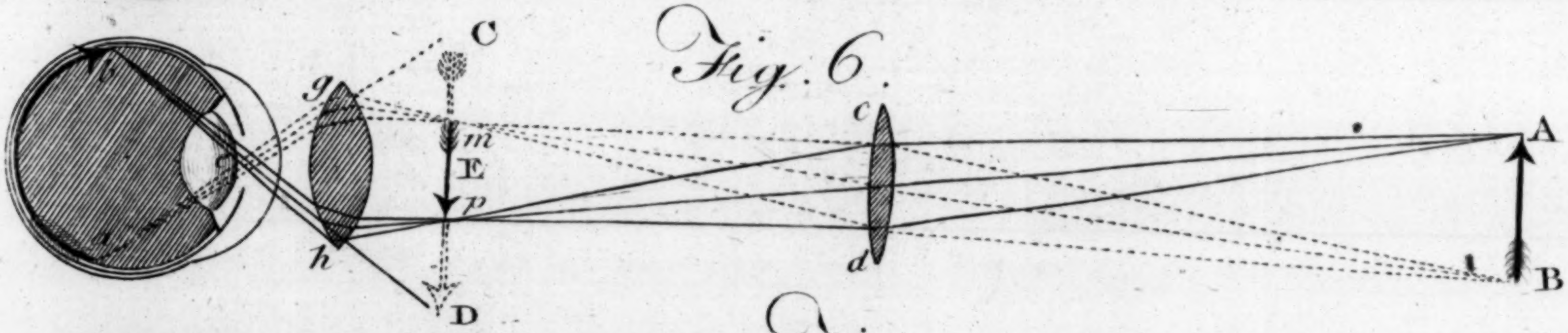

C
g
m
E
p
h
D
c
A
d
B

Fig. 7.

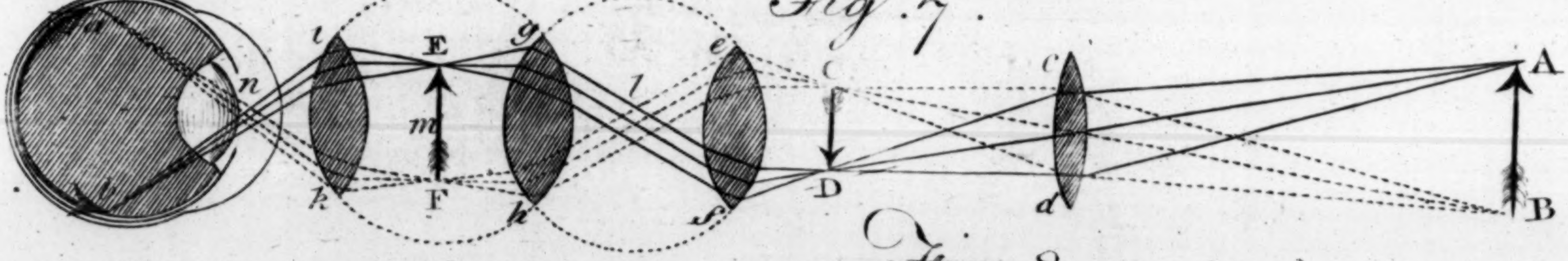
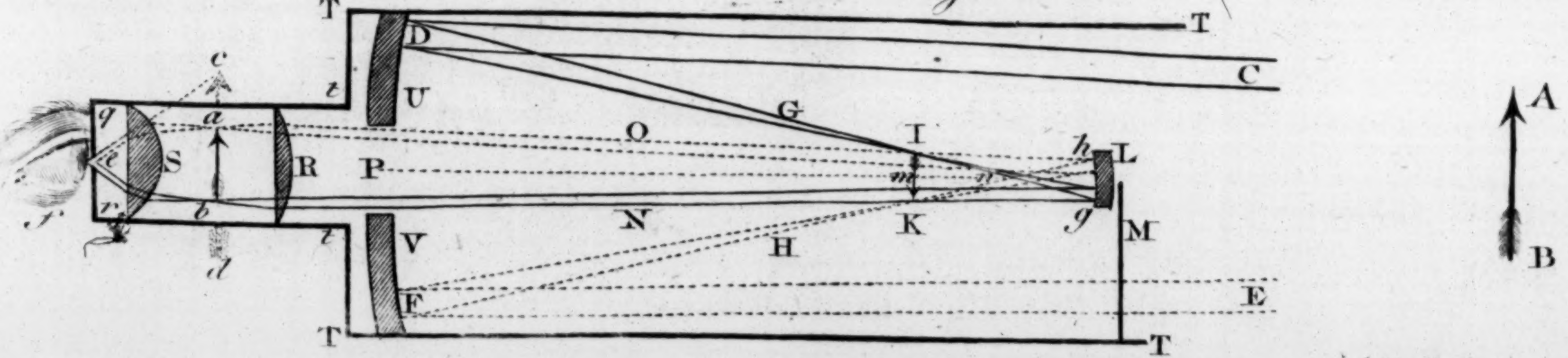

i
E
g
e
C
c
A
n
m
l
k
F
h
f
D
d
B

Fig. 8.


T
D
T
C
c
t
U
G
A
q
a
O
I
h
L
e
S
R
P
m
n
r
b
N
K
g
M
t
V
H
d
F
E
T
T
B

A. Bell Sc.

3 MA 53

Fig. 1.

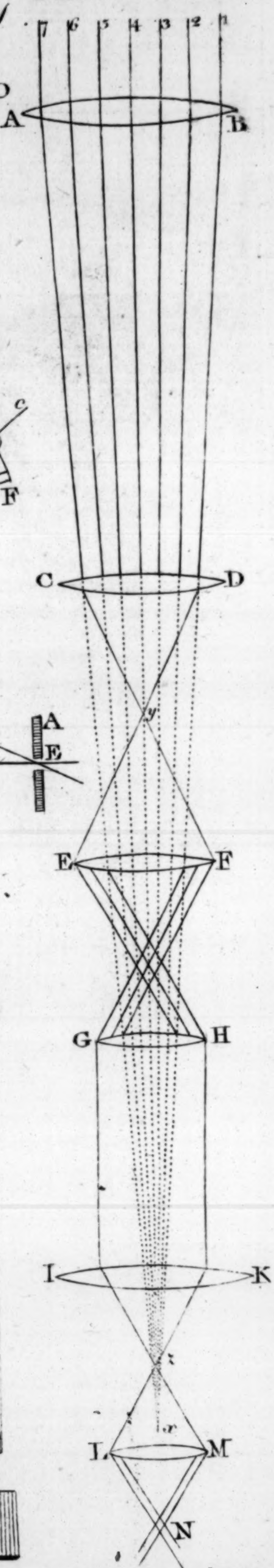

7
6
5
4
3
2
1
A
B
C
D
y
E
F
G
H
I
K
z
x
L
M
N

Fig. 2.

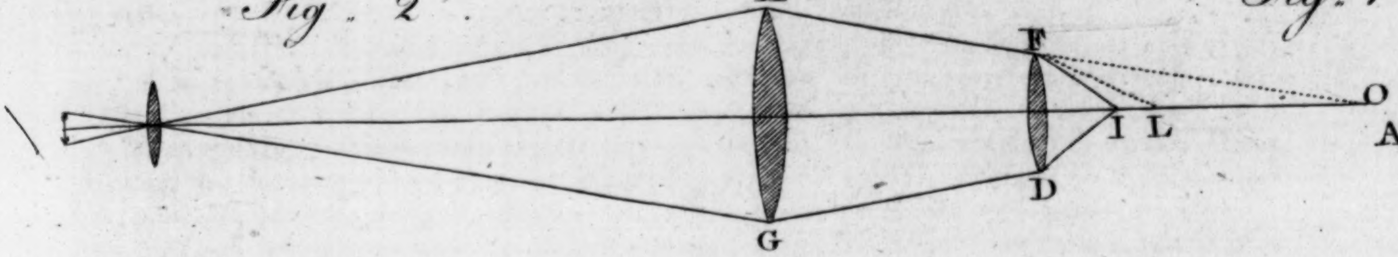


Fig. 3.

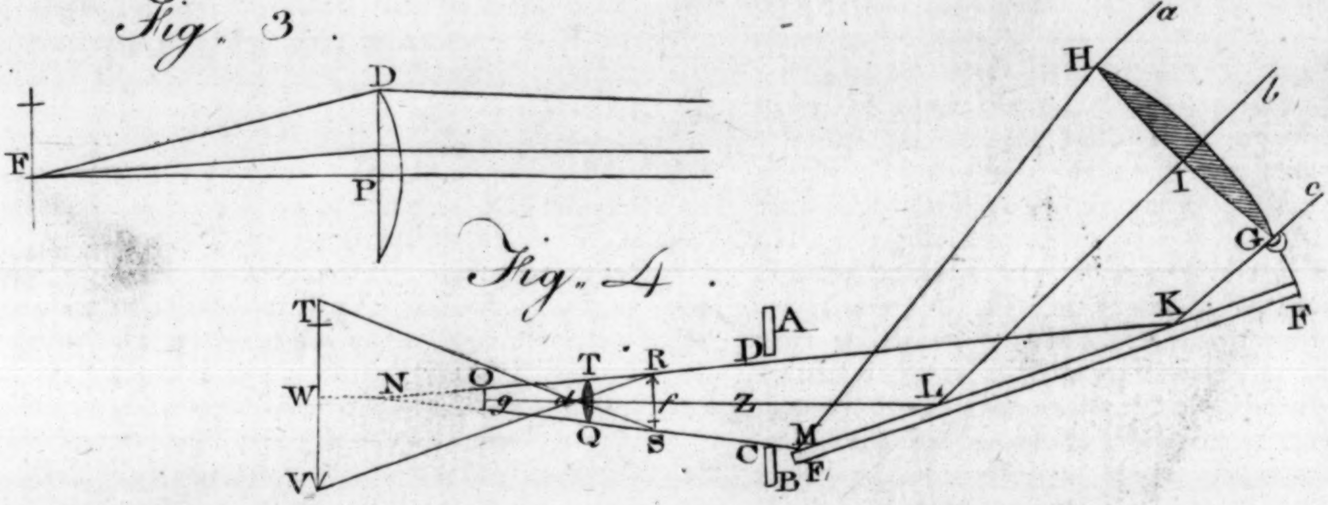

D
F
P

Fig. 4.

a
H
b
I
c
G
K
F
T
A
D
R
O
T
W
N
q
r
Z
L
Q
S
M
V
C
B
F

Fig. 5.

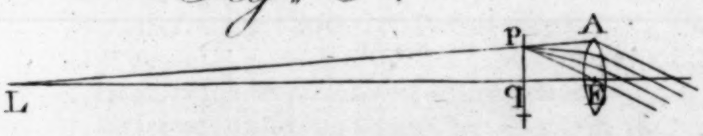


Fig. 6.

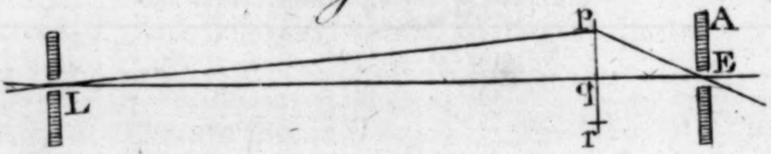


Fig. 7.

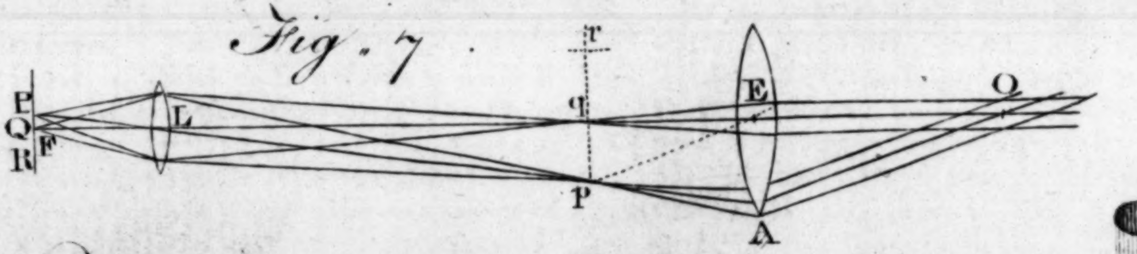
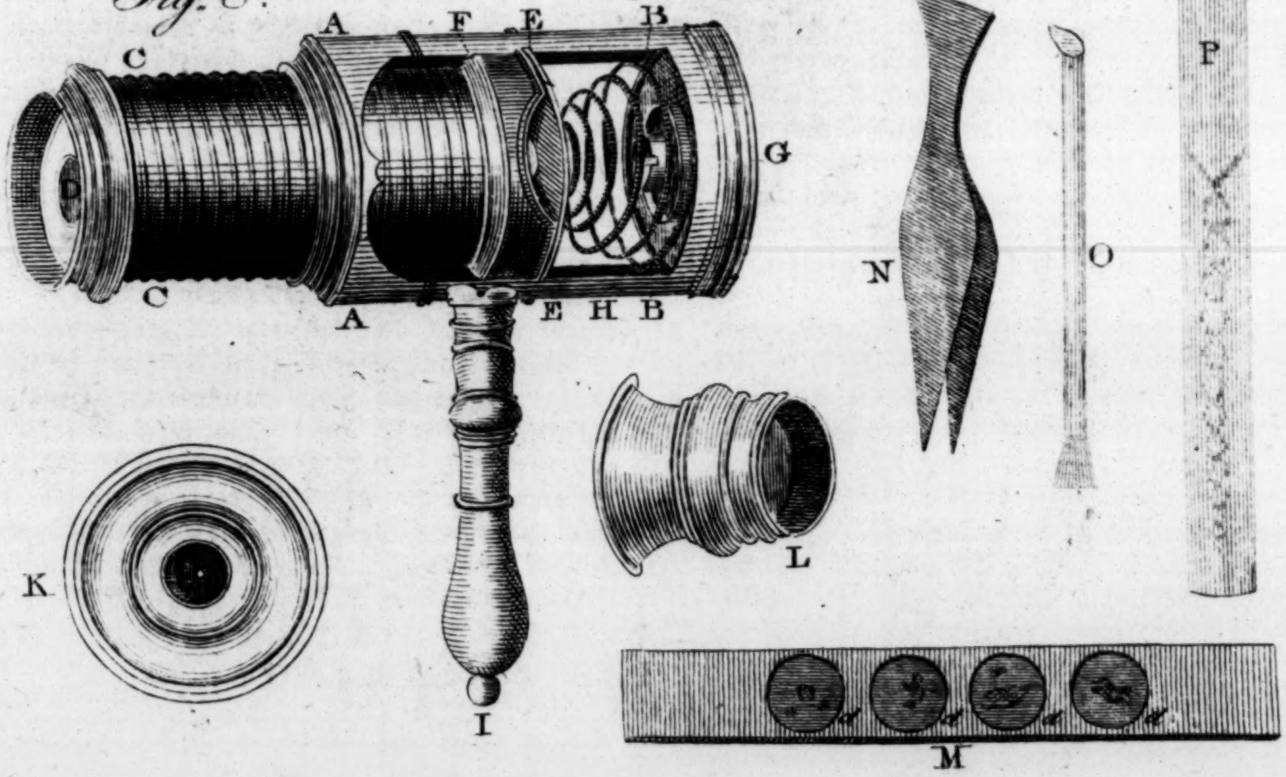

r
P
Q
R
F
L
q
E
O
p
A

Fig. 8.


A
F
E
B
C
D
G
C
A
E
H
B
N
O
P
K
I
L
M

A Bell Sculp^t.

3 MA 55

diſtances; and ſince the field of view is divided into equal ſquares, it is uſeful in drawing the perſpective appearance of objects. As all foreign light is excluded by the tube in which theſe lenſes are incloſed, pictures ſeen through this machine have a fine relievo; on which account, as alſo becauſe objects appear inverted through it, the images of a camera obſcura are viewed to particular advantage by its means. If a lens of a greater focal length be fixed at a proper diſtance from the centre of the tube, this inſtrument will be a teleſcope, and will magnify the prints which are looked at through it; and if a ſmall lens be uſed, it will be a microſcope, and the ſame micrometer will ſerve for both.

§ 3. *Of the Single Microſcope.*

The famous microſcopes made uſe of by Mr Leeuwenhoek, were all, as Mr Baker aſſures us, of the ſingle kind, and the conſtruction of them the moſt ſimple poſſible, each conſiſting only of a ſingle lens ſet between two plates of ſilver, perforated with a ſmall hole, with a moveable pin before it to place the object on, and adjuſt it to the eye of the beholder. He informs us alſo, that *lenſes* only, and not *globules*, were uſed in every one of theſe microſcopes.

Plate CCXVIII. fig. 8.

The ſingle microſcope now moſt generally known and uſed is that called *Wilſon's Pocket Microſcope.* The body is made of braſs, ivory, or ſilver, and is repreſented by AA, BB. CC is a long fine-threaded male-ſcrew that turns into the body of the microſcope. D a convex glaſs at the end of the ſcrew. *, Two concave round pieces of thin braſs, with holes of different diameters in the middle of them, to cover the abovementioned glaſs, and thereby diminiſh the aperture when the greateſt magnifiers are employed. EE, three thin plates of braſs within the body of the microſcope; one of which is bent ſemicircularly in the middle, ſo as to form an arched cavity for the reception of a tube of glaſs, the uſe of the other two being to receive and hold the ſliders between them. F, a piece of wood or ivory, arched in the manner of the ſemicircular plate, and cemented thereto. G, the other end of the body of the microſcope, where a hollow female ſcrew is adapted to receive the different magnifiers. H, is a ſpiral ſpring of ſteel, between the end G and the plates of braſs, intended to keep the plates in a right poſition, and counteract the long ſcrew CC. I, is a ſmall turned handle, for the better holding of the inſtrument, to ſcrew on or off at pleaſure.

To this microſcope belong ſix or ſeven magnifying glaſſes: ſix of them are ſet in ſilver, braſs, or ivory, as in the figure K, and marked 1, 2, 3, 4, 5, 6; the loweſt numbers being the greateſt magnifiers. L, is the ſeventh magnifier, ſet in the manner of a little barrel, to be held in the hand for the viewing of any larger object. M, is a flat ſlip of ivory, called a *ſlider*, with four round holes thro' it, wherein to place objects between two pieces of glaſs, or Muſcovy talc, as they appear *d d d d.* Eight ſuch ſliders, and one of braſs, are uſually ſold with this microſcope; ſome with objects placed in them, and others empty for viewing any thing that may offer: but whoever pleaſes to make a collection, may have as many as he deſires. The braſs ſlider is to confine any ſmall object, that it may be viewed without cruſhing or deſtroying it.

N, is a forceps, or pair of plyers, for the taking up of inſects or other objects, and adjuſting them to the glaſſes. O, is a little hair-bruſh or pencil, wherewith to wip any duſt from off the glaſſes, or to take up any ſmall drop of liquid, which one would want to examine, and put it upon the talcs, or iſinglaſs. P is a tube of glaſs contrived to confine living objects, ſuch as frogs, fiſhes, &c. in order to diſcover the circulation of the blood. All theſe are contained in a little neat box, very convenient for carrying in the pocket.

When an object is to be viewed, thruſt the ivory ſlider, in which the ſaid object is placed, between the two flat braſs plates EE: obſerving always to put that ſide of the ſlider where the braſs rings are, fartheſt from the eye. Then ſcrew on the magnifying glaſs you intend to uſe, at the end of the inſtrument G; and looking thro' it againſt the light, turn the long ſcrew CC, till your object be brought to fit your eye; which will be known by its appearing perfectly diſtinct and clear. It is moſt proper to look at it firſt through a magnifier that can ſhew the whole at once, and afterwards to inſpect the ſeveral parts more particularly with one of the greateſt magnifiers; for thus you will gain a true idea of the whole, and of all its parts. And tho' the greateſt magnifiers can ſhew but a minute portion of any object at once, ſuch as the claw of a flea, the horn of a louſe, or the like, yet by gently moving the ſlider which contains the object, the eye will gradually overlook it all.

As objects muſt be brought very near the glaſſes when the greateſt magnifiers are made uſe of, be careful not to ſcatch them by rubbing the ſlider againſt them as you move it in or out. A few turns of the ſcrew CC will eaſily prevent this miſchief, by giving them room enough. You may change the objects in your ſliders for what others you think proper, by taking out the braſs rings with the point of a pen-knife; the iſinglaſs will then fall out, if you but turn the ſliders; and after putting what you pleaſe between them, by replacing the braſs rings you will faſten them as they were before. It is proper to have ſome ſliders furniſhed with talcs, but without any object between them, to be always in readineſs for the examination of fluids, ſalts, ſands, powders, the farina of flowers, or any other caſual objects of ſuch ſort as need only be applied to the outſide of the talc.

The circulation of the blood may be eaſieſt ſeen in the tails or fins of fiſhes, in the fine membranes between a frog's toes, or beſt of all in the tail of a water-newt. If your object be a ſmall fiſh, place it within the tube, and ſpread its tail or fin along the ſide thereof: if a frog, chooſe ſuch an one as can but juſt be got into your tube; and, with a pen, or ſmall ſtick, expand the tranſparent membrane between the toes of the frog's hind foot as much as you can. When your object is ſo adjuſted, that no part of it can intercept the light from the place you intend to view, unſcrew the long ſcrew CC, and thruſt your tube into the arched cavity, quite thro' the body of the miſcrope; then ſcrew it to the true focal diſtance, and you will ſee the blood paſſing along its veſſels with a rapid motion, and in a moſt ſurpriſing manner.

The third or fourth magnifiers may be uſed for frogs or fiſhes: but for the tails of water-newts, the fifth or ſixth will do; becauſe the globules of their blood are twice as large as thoſe of frogs or fiſh. The firſt or ſecond magnifier cannot well be employed for this purpoſe; becauſe the thickneſs of the tube in which the object lies, will ſcarce admit its being brought ſo near as the focal diſtance of the magnifier.

§ 5. *The Single Microſcope with Reflection.*

Plate CCXIX.

In fig. 2. A is a ſcroll of braſs fixed upright on a round pedeſtal of wood B, ſo as to ſtand perfectly firm and ſteady. C is a braſs ſcrew, that paſſes thro' a hole in the upper limb of the ſcroll, into the ſide of the microſcope D, and ſcrews it faſt to the ſaid ſcroll. E, is a concave ſpeculum ſet in a box of braſs, which hangs in the arch G by two ſmall ſcrews *ff*, that ſcrew into the oppoſite ſides thereof. At the bottom of this arch is a pin of the ſame metal, exactly fitted to a hole *h* in the wooden pedeſtal, made for the reception of the pin. As the arch turns on this pin, and the ſpeculum turns on the ends of the arch, it may, by this twofold motion, be eaſily adjuſted in ſuch a manner as to reflect the light of the ſun, of the ſky, or of a candle, directly upwards through the microſcope that is fixed perpendicularly over it; and by ſo doing, may be made to anſwer almoſt all the purpoſes of the large double reflecting microſcope. The body of the microſcope may alſo be fixed horizontally, and objects viewed in that poſition by any light you chooſe, which is an advantage the double reflecting microſcope has not. It may alſo be rendered further uſeful by means of a ſlip of glaſs, one end of which being thruſt thro' between the plates where the ſliders go, and the other extending to ſome diſtance, ſuch objects may be placed thereon as cannot be applied in the ſliders: and then, having a limb of braſs that may faſten to the body of the microſcope, and extend over the projecting glaſs a hollow ring wherein to ſcrew the magnifiers, all ſorts of ſubjects may be examined with great conveniency, if a hole be made in the pedeſtal, to place the ſpeculum exactly underneath, and thereby throw up the rays of light.

The pocket-microſcope, thus mounted, ſays Mr Baker, "is as eaſy and pleaſant in its uſe; as fit for the moſt curious examination of the animalcules and ſalts in fluids, of the farinæ in vegetables, and of the circulation in ſmall animals; in ſhort, is as likely to make conſiderable diſcoveries in objects that have ſome degree of tranſparency, as any microſcope I have ever ſeen or heard of."

§ 5. *Of the Double Refracting and Reflecting Microſcopes.*

Double microſcopes are ſo called as being a combination of two or more lenſes.

The only advantage which the double *refracting* microſcope hath over the ſingle one is, that it takes in a larger field of view; and therefore hath yielded to the double *reflecting* microſcope, which gives a clearer view of objects, with a greater power of magnifying at the ſame time.

Fig. 3.

The body of this microſcope AAAA is a large tube, ſupported by three braſs pillars *b b b*, riſing from a wooden pedeſtal C; in which pedeſtal is a drawer D, to hold the object-glaſſes and other parts of the apparatus. A leſſer tube *e e* ſlides into the greater, and ſends from its bottom another tube *f*, much ſmaller than itſelf, with a male ſcrew *g* at the end thereof, whereon to ſcrew the object-glaſs or magnifier. There are five of theſe magnifiers, numbered 1, 2, 3, 4, 5; which numbers are alſo marked on the inner tube, to direct whereabout to place it according to the magnifier made uſe of: but if then it fits not the eye exactly, ſlide the inner tube gently higher or lower, or turn the ſcrew of the magnifier gradually, till the object appears diſtinct. The greateſt magnifiers have the ſmalleſt apertures and the loweſt numbers.

L, is a circular plate of braſs fixed horizontally between the three braſs pillars, and in the centre thereof a round hole M is adapted to receive a proper contrivance N for holding ivory ſliders wherein objects are placed: this contrivance conſiſts of a ſpiral ſteel wire confined between three braſs circles, one whereof is moveable for the admiſſion of a ſlider. O is a round braſs plate with ſeveral holes for placing objects in, ſome of which are uſually furniſhed with them at the ſhops: but two holes are commonly reſerved for ſmall concave glaſſes, whereon to place a drop of any liquid, in order to view the animalcules, &c. There is alſo a piece of white ivory, and a piece of black ebony, of the ſame ſize and ſhape as the holes for objects: the ivory is for holding ſuch opaque objects as are black, and the ebony ſuch as are white, by which contrariety of colours they will be ſeen more diſtinctly. At the bottom of this object-plate is a button to ſlip into a ſlit P, that fits it, on the circular plate of braſs: and by turning it round on this, all the objects may be examined ſucceſſively with very little trouble.

Q, is a concave ſpeculum ſet in a box of braſs, and turning in an arch R, upon two ſmall ſcrews *s s*. From the bottom of the arch comes a pin, which being let down into a hole *t*, in the centre of the pedeſtal, enables the ſpeculum to turn either vertically or horizontally, and to reflect the light directly upwards on the object to be viewed. V, is a plano-convex lens, which by turning on two ſcrews **, when the pin at the bottom of it is placed in the hole W, for its reception in the circular plate L, will tranſmit the light of a candle to illuminate any opaque object that is put on the round piece of ivory or on the ebony for examination: and it may be moved higher or lower, as the light requires. This glaſs is of ſervice to point the ſunſhine or the light of a candle upon any opake object, but in plain day-light is of no great uſe. X, is a cone of black ivory, to faſten on a ſhank underneath the braſs circular plate L, principally when the firſt or ſecond magnifier is made uſe of, and the object very tranſparent: for objects are rendered much more diſtinctly viſible, by intercepting ſome part of the oblique rays which come from the ſpeculum. The braſs fiſh-pan Y is to faſten any ſmall fiſh upon, to ſee the circulation of the blood in its tail. For this purpoſe, the tail of the fiſh muſt be expanded acroſs the oblong hole at the ſmalleſt end of the pan: then by ſlipping the button on the backſide of the pan into the ſlit P thro' the circular plate L,

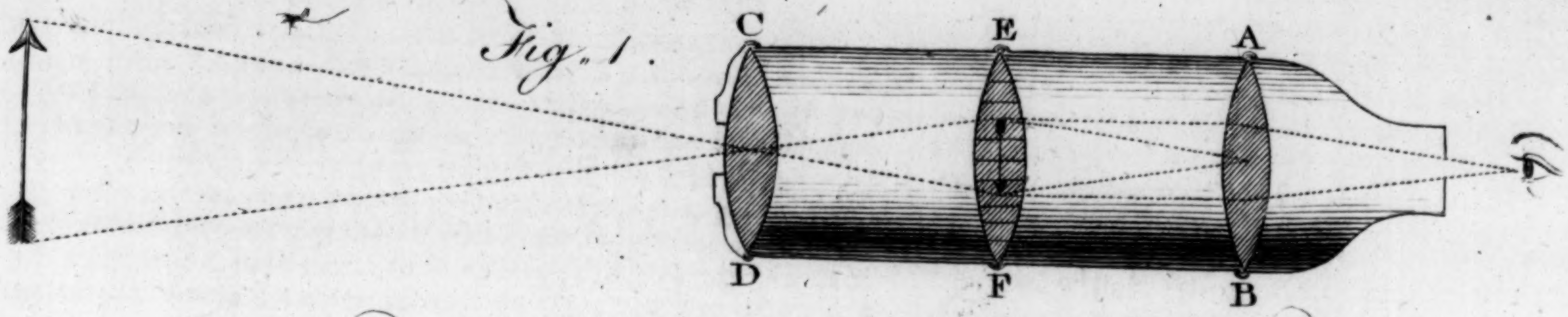


Fig. 1.
C
D
E
F
A
B

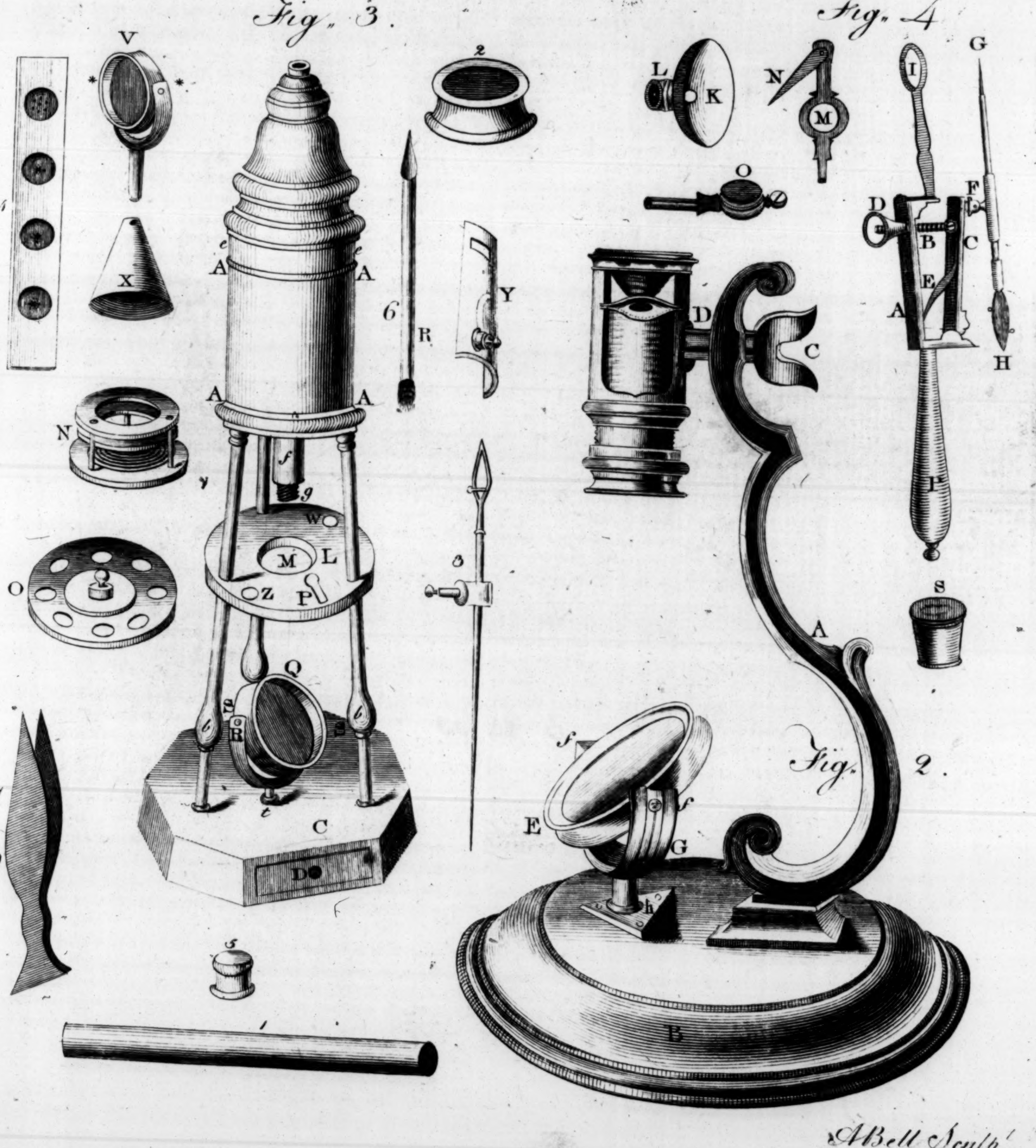


Fig. 3.
V
X
4
N
O
7
Q
2
6
R
Y
8
5
1
A
A
A
A
e
e
f
g
W
M
L
Z
P
Q
S
R
S
b
b
t
C
D
Fig. 4.
L
K
N
M
O
I
G
F
D
B
C
E
A
H
P
S
D
C
A
f
E
f
G
h
B
Fig. 2.

A Bell Sculp.

3 MA 53

L, the ſpring that comes from the button will make it ſteady, and preſent it well to view. But if it be a frog, a newt, or an eel, in which the circulation is deſired to be ſhewn, a glaſs tube 1 is fitteſt for the purpoſe. The tail of a newt or eel, or, in a frog, the web between the toes of the hind-feet, are the parts where it may be ſeen beſt. When the object is well expanded on the inſide of the tube, ſlide the tube along under the circular braſs plate L, (where there are two ſprings and a cavity made in the ſhank to hold it), and bring your object directly under the magnifier.

There are three of theſe glaſs tubes ſmaller one than another, and the ſize of the object muſt direct which of them is to be uſed; but, in general, the leſs room the creature has to move about in, the eaſier will it be managed.

The cell 2, with a concave and a plane glaſs in it, is intended to confine fleas, lice, mites, or any ſmall living objects, during pleaſure; and by placing it over the hole M, in the middle of the circular braſs plate, they may be viewed with much conveniency. Three looſe glaſſes, viz. one plane, and two concave, belong alſo to this microſcope; and are deſigned to confine objects, or to place them upon occaſionally. The long ſteel wire 3, with a pair of plyers at one end, and a point on the other, to hold faſt or ſtick objects upon, ſlips backward or forward in a ſhort braſs tube whereto a button is faſtened, which fits into the little hole *z*, near the edge of the braſs plate L: and then the object may be readily brought to a right poſition, and a light be caſt upon it either by the ſpeculum underneath, or, if it be opake, by the plano-convex lens V. 4, Is a flat piece of ivory called a *ſlider*, with four round holes thro' it, and objects placed in them, between Muſcovy talcs or iſinglaſs, kept in by braſs wires. It is proper to have a number of theſe ſliders, filled with curious objects, always ready, as well as ſome empty ones for any thing new that offers. When made uſe of, thruſt them between the braſs rings of the contrivance on purpoſe for them, which ſhoots into the round hole M, in the centre of the braſs plate L. This keeps them ſteady, and at the ſame time permits them to be moved to and fro for a thorough examination. 5, Is a little round ivory box to hold pieces of iſinglaſs for the ſliders; 6, a ſmall hair-bruſh to wipe off any duſt from the glaſſes, or to apply a drop of any liquid; 7, a pair of nippers to take up any object to be examined.

§ 6. *The Microſcope for Opaque Objects.*

THIS microſcope remedies the inconvenience of having the dark ſide of an object next the eye, which formerly was an unſurmountable objection to the making obſervations on opaque objects with any conſiderable degree of exactneſs or ſatiſfaction: for, in all other contrivances commonly known, the nearneſs of the inſtrument to the object (when glaſſes that magnify much are uſed) unavoidably overſhadows it ſo much, that its appearance is rendered obſcure and indiſtinct. And, notwithſtanding ways have been tried to point light upon an object, from the ſun or a candle, by a convex glaſs placed on the ſide thereof, the rays from either can be thrown upon it in ſuch an acute angle only, that they ſerve to give a confuſed glare, but are inſufficient to afford a clear and perfect view of the object. But in this microſcope, by means of a concave ſpeculum of ſilver highly poliſhed, in whoſe centre a magnifying lens is placed, ſuch a ſtrong and direct light is reflected upon the object, that it may be examined with all imaginable eaſe and pleaſure. The ſeveral parts of this inſtrument, made either of braſs or ſilver, are as follow.

Plate CCXIX. fig. 4.

Thro' the firſt ſide A, paſſes a fine ſcrew B, the other end of which is faſtened to the moveable ſide C. D is a nut applied to this ſcrew, by the turning of which the two ſides A and C are gradually brought together. E, is a ſpring of ſteel that ſeparates the two ſides when the nut is unſcrewed. F a piece of braſs, turning round in a ſocket, whence proceeds a ſmall ſpring-tube moving upon a rivet, thro' which tube there runs a ſteel wire, one end whereof terminates in a ſharp point G, and the other hath a pair of plyers H faſtened to it. The point and plyers are to thruſt into, or take up and hold, any inſect or object; and either of them may be turned upwards, as beſt ſuits the purpoſe. I, is a ring of braſs, with a female ſcrew within it, mounted on an upright piece of the ſame metal; which turns round on a rivet, that it may be ſet at a due diſtance when the leaſt magnifiers are employed. This ring receives the ſcrews of all the magnifiers. K, is a concave ſpeculum of ſilver, poliſhed as bright as poſſible; in the centre of which is placed a double convex lens, with a proper aperture to look thro' it. On the back of this ſpeculum, a male ſcrew, L, is made to fit the braſs ring I, to ſcrew into it at pleaſure. There are four of theſe concave ſpecula of different depths, adapted to four glaſſes of different magnifying powers, to be uſed as the objects to be examined may require. The greateſt magnifiers have the leaſt apertures. M, is a round object-plate, one ſide of which is white and the other black: The intention of this is to render objects the more viſible, by placing them, if black, on the white ſide, or, if white, on the black ſide. A ſteel ring, N, turns down on each ſide to make any object faſt; and iſſuing from the object-plate is a hollow pipe to ſcrew it on the needle's point G. O is a ſmall box of braſs, with a glaſs on each ſide, contrived to confine any living object, in order to examine it: this alſo has a pipe to ſcrew upon the end of the needle G. P, is a turned handle of wood, to ſcrew into the inſtrument when it is made uſe of. Q, a pair of braſs plyers to take up any object, or manage it with conveniency. R is a ſoft hair-bruſh for cleaning the glaſſes, &c. S, is a ſmall ivory box for iſinglaſſes, to be placed, when wanted, in the ſmall braſs box O.

When you would view any object with this microſcope, ſcrew the ſpeculum, with the magnifier you think proper to uſe, into the braſs ring I. Place your object, either on the needle G in the plyers H, on the object-plate M, or in the hollow braſs box O, as may be moſt convenient: then holding up your inſtrument by the handle P, look againſt the light thro' the magnifying lens; and by means of the nut D, together with the motion of the needle, by managing its lower end, the object may be turned about, raiſed, or depreſſed, brought nearer the glaſs, or removed farther from it, till you hit the true focal diſtance, and the light be ſeen ſtrongly reflected from the ſpeculum upon the object, by which means it will be ſhewn in a manner ſurpriſingly diſtinct and clear; and for this purpoſe the light of the ſky or of a candle will anſwer very well. Tranſparent objects may alſo be viewed by this microſcope: only obſerving, that when ſuch come under examination, it will not always be proper to throw on them the light reflected from the ſpeculum; for the light tranſmitted thro' them, meeting the reflected light, may together produce too great a glare. A little practice, however, will ſhew how to regulate both lights in a proper manner.

§ 7. *The Solar Microſcope.*

This inſtrument is compoſed of a tube, a looking-glaſs, a convex lens, and Wilſon's ſingle pocket microſcope before deſcribed. The ſun's rays being directed thro' the tube, by means of the looking-glaſs, upon the object, the image or picture of the object is thrown diſtinctly and beautifully upon a ſcreen of white paper, or a white linen ſheet, placed at a proper diſtance to receive the ſame; and may be magnified to a ſize not to be conceived by thoſe who have not ſeen it: for the farther the ſcreen is removed, the larger will the object appear; inſomuch, that a louſe may thus be magnified to the length of five or ſix feet, or even a great deal more; though it is more diſtinct, when not enlarged to above half that ſize.—The apparatus for this purpoſe is as follows.

Plate CCXX. fig. 1.

A, a ſquare wooden frame, thro' which paſs two long ſcrews aſſiſted by a couple of nuts 1, 1. Faſten it firmly to a window-ſhutter, wherein a hole is made for its reception; the two nuts being let into the ſhutter, and made faſt thereto. A circular hole is made in the middle of this frame to receive a piece of wood, B, of a circular figure; whoſe edge, that projects a little beyond the frame, compoſes a ſhallow groove 2, wherein runs a catgut 3; which, by twiſting round, and then croſſing over a braſs pulley 4, (the handle whereof, 5, paſſes thro' the frame) affords an eaſy motion for turning round the circular piece of wood B, with all the parts affixed to it. C is a braſs tube covered with ſeal-ſkin; which, ſcrewing into the middle of the circular piece of wood, becomes a caſe for the uncovered braſs tube D to be drawn backwards or forwards in. E is a ſmaller tube, of about one inch in length cemented to the end of the larger tube D. F is another braſs tube, made to ſlide over the above deſcribed tube E; and to the end of this the microſcope muſt be ſcrewed, when we come to uſe it. 5, a convex lens, whoſe focus is about 12 inches, deſigned to collect the ſun's rays, and throw them more ſtrongly upon the object. G is a looking-glaſs of an oblong figure, ſet in a wooden frame, faſtened by hinges in the circular piece of wood B, and turning about therewith by means of the abovementioned cat-gut. H is a jointed wire, partly braſs, and partly iron; the braſs part whereof, 6, which is flat, being faſtened to the looking-glaſs, and the iron part, 7, which is round, paſſing thro' the wooden frame, enable the obſerver, by putting it backwards or forwards, to elevate or depreſs the glaſs according to the ſun's altitude. There is a braſs ring at the end of the jointed wire, whereby to manage it with the greater eaſe. The extremities of the cat-gut are faſtened to a braſs pin, by turning of which it may be braced up, if at any time it becomes too ſlack.

When this microſcope is employed, the room muſt be rendered as dark as poſſible; for on the darkneſs of the room, and the brightneſs of the ſunſhine, depend the ſharpneſs and perfection of your image. Then putting the looking-glaſs G thro' the hole in your window-ſhutter, faſten the ſquare frame A to the ſhutter by its two ſcrews and nuts 1, 1. This done, adjuſt your looking-glaſs to the elevation and ſituation of the ſun, by means of the jointed wire H, together with the cat-gut and pulley, 3, 4. For the firſt of theſe raiſing or lowering the glaſs, and the other inclining it to either ſide, there reſults a twofold motion, which may eaſily be ſo managed as to bring the glaſs to a right poſition, that is, to make it reflect the ſun's rays directly thro' the lens, 5, upon the paper ſcreen, and form thereon a ſpot of light exactly round. But tho' the obtaining a perfect circular ſpot of light upon the ſcreen before you apply the microſcope, is a certain proof that your looking-glaſs is adjuſted right, that proof muſt not always be expected: for the ſun is ſo low in winter, that if it ſhines in a direct line againſt the window, it cannot then afford a ſpot of light exactly round; but if it be on either ſide, a round ſpot may be obtained, even in December. As ſoon as this appears, ſcrew the tube C into the braſs collar provided for it in the middle of your wood-work, taking care not to alter your looking-glaſs: then ſcrewing the magnifier you chooſe to employ to the end of your microſcope, in the uſual manner, take away the lens at the other end thereof, and place a ſlider, containing the object to be examined, between the thin braſs plates, as in the other ways of uſing the microſcope.

Things being thus prepared, ſcrew the body of your microſcope to the ſhort braſs tube F; which ſlip over the ſmall end E of the tube D, and pull out the ſaid tube D leſs or more, as your object is capable of enduring the ſun's heat. Dead objects may be brought within about an inch of the focus of the convex lens, 5; but the diſtance muſt be ſhortened for living creatures, or they will ſoon be killed.

If the light falls not exactly right, you may eaſily, by a gentle motion of the jointed wire and pulley, direct it thro' the axis of the microſcopic lens. The ſhort tube F, to which the microſcope is ſcrewed, renders it eaſy, by ſliding it backwards or forwards on the other tube E, to bring the objects to their focal diſtance; which will be known by the ſharpneſs and clearneſs of their appearance: they may alſo be turned round by the ſame means, without being in the leaſt diſordered.

The magnifiers moſt uſeful in the ſolar microſcope are in general, the fourth, fifth, or ſixth. The ſcreen on which the repreſentations of the objects are thrown, is uſually compoſed of a ſheet of the largeſt elephant paper, ſtrained on a frame which ſlides up or down, or turns about at pleaſure on a round wooden pillar, after the manner of ſome fire-ſcreens. Larger ſcreens may alſo be made of ſeveral ſheets of the ſame paper paſted together on cloth, and let down from the ceiling with a roller like a large map.

"This microſcope (ſays Mr Baker) is the moſt entertaining of any; and perhaps the moſt capable of making diſcoveries in objects that are not too opaque: as it ſhews them much larger than can be done any other way. There are alſo ſeveral conveniencies attending it, which no other microſcope can have: for the weakeſt eyes may uſe it without the leaſt ſtraining or fatigue: numbers of people together may view any object at the ſame time, and, by pointing to the particular parts thereof, and diſcourſing on what lies before them, may be able better to underſtand one another, and more likely to find out the truth, than in other microſcopes, where they muſt peep one after another, and perhaps ſee the object neither in the ſame light nor in the ſame poſition. Thoſe alſo, who have no ſkill in drawing, may, by this contrivance, eaſily ſketch out the exact figure of any object they have a mind to preſerve a picture of; ſince they need only faſten a paper on the ſcreen, and trace it out thereon either with a pen or pencil, as it appears before them. It is worth the while of thoſe who are deſirous of taking many draughts in this way, to get a frame, wherein a ſheet of paper may be put in or taken out at pleaſure; for if the paper be ſingle, the image of an object will be ſeen almoſt as plainly on the back as on the fore ſide, and, by ſtanding behind the ſcreen, the ſhade of the hand will not obſtruct the light in drawing, as it muſt in ſome degree when one ſtands before it."

§ 8. *Univerſal Microſcope.*

Plate CCXXI. fig. 1.

ABC, is the body of the microſcope.

D, is a joint, by which it is moveable vertically.

E, is a hollow ſquare ſocket, with

F, a ſcrew, by which it is fixed to the part at D.

DQR is a ſtrong braſs pillar or ſtand.

S, T, V, the tripod, or three feet, on which it ſtands.

GHI is a ſtage on which objects of different ſorts are placed to be viewed.

K, is a ſtrong ſcrew by which the ſtage is rendered moveable horizontally.

MN, are two braſs ſockets, connected by an adjuſting ſcrew, and moveable up and down upon the ſquare part of the ſtand.

O is a ſcrew for fixing the ſocket M.

P is a long adjuſting ſcrew by which the ſocket N is moveable, and the objects upon the ſtage adjuſted to the view.

W is a concave mirror, or ſpeculum, fixed at

X, juſt under the central part of the ſtage, for illuminating tranſparent objects.

Y is a concave lens moveable at

Z, in a ſpring ſocket; by this lens opaque bodies are ſufficiently enlightened for the view.

This compound microſcope is in the beſt manner adapted to view tranſparent objects; for if they are ſuch as can be put into the concave glaſs in the middle of the ſtage at H, then they will be ſufficiently enlightened by the reflector W below, in one ſide of which is a plane ſpeculum, and in the other a concave one, as both ſorts are occaſionally neceſſary.

If the tranſparent objects are ſuch as may be included between talcs in the ivory ſliders, then there is a part Fig. 2.
ABCD, called the *ſlider-holder*, which is fitted to the hole at H in the middle of the ſtage, and in which all the variety of objects in ſliders may be viewed to great perfection by reflected light from the ſpeculum W below.

As ſome curious experiments with tranſparent objects require the light to be very pure, and adjuſted to a proper degree, there is an inverted cone of braſs,
ABC, to be placed in the under part of the hole at Fig. 3.
H by its broad end or baſe AC; and by the narrow end B only the interior and purer light contained in the upper and denſer part of the large cone of rays reflected by the ſpeculum W, can illuminate the objects to be viewed. This cone is indeed of more immediate uſe in the ſingle microſcope, to be mentioned by and by. Thus, it is plain, in one or other of theſe ways all kinds of tranſparent objects are to be viewed in the utmoſt perfection.

In this conſtruction it is alſo as evident, that every opaque object may be ſhewn as well in this as in that which is uſually called the *opaque microſcope*: becauſe here is all the ſame apparatus for that purpoſe, and much more; for this is both a ſingle and compound opaque microſcope.

Thus, if any opaque object be laid upon the glaſs at H, it may be very ſtrongly illuminated by the lens Y, moveable higher or lower in the ſocket Z, to make the light upon the object greater or leſs, as occaſion requires. In this caſe you have the advantage of a large and delightful field of view, and objects of all ſhapes and ſizes are immediately viewed upon the ſtage GHI, as it is ſo eaſily moved up and down by the ſliding ſockets M and N, faſtened in any poſition by the ſcrew O, and adjuſted for the moſt accurate inſpection by the ſcrew P.

In many caſes it may be requiſite to view light-coloured objects upon a dark ground, and the contrary: therefore, to anſwer ſuch purpoſes, there is provided a round flat piece of ivory, with one ſide white and the other black, fitted into the hole at G, and to be taken in and out at pleaſure.

To anſwer theſe purpoſes ſtill more generally, there
is a pair of plyers, AB, moveable in a braſs ſpring Fig. 4.
ſocket at C, and by the ſhank at D it is fitted in the hole of the ſtage at I, where it has a horizontal motion, and alſo a vertical motion (up and down) by its joint at E. By the pincers at the end A any object may be very readily adjuſted to the view, and illumined by the lens Y. Alſo at the other end of the plyers B, there is a ſmall cylindric piece of ivory F ſcrewed on, with one end black, the other white, for the abovementioned purpoſes.

But oftentimes objects will be found which require the uſe of the plyers AB, and are ſeen to the greateſt advantage by light reflected upon them; for which purpoſe a ſmall concave metallic ſpeculum AB is ſcrew-
ed into the end CD of a tube CDEF, which is Fig. 5.
made to go on upon the pipe of the microſcope; and the large cone of reflected light from the mirror W will paſs through the hole H to this ſmall concave AB, by which it will be reflected upon the object in the plyers at A, but more eſpecially upon the ivory at F, where exceeding ſmall objects require the greateſt degree of light they can bear.

Further, to make this microſcope anſwer all the ends of a ſingle opaque microſcope, there is a braſs piece
AB, with a ſquare hole or ſocket, to go on upon the Fig. 6.
ſhank at D (fig. 1.) when the body of the microſcope ABC is taken off, and is there made faſt by the ſcrew

C.

C. To this is annexed a ſtrong braſs ring DE, into which are ſcrewed the ſame *Liberkhuns*, as they are called, or concaves with a ſmall lens in the middle of each, as are uſed in the ſingle opaque microſcope; and being applied to objects on the ſtage GHI, or in the plyers, they are viewed in the ſame mannner here as they are there; with this additional advantage, that in the preſent microſcope, the light is much more intenſe from the ſpeculum W, than the common light but once reflected in the uſual form of this inſtrument.

Laſtly, every thing ſhewn in the aquatic microſcope is to be ſeen equally in this; becauſe, ſince the hole at H in the ſtage is very large, it will admit of a concavity ſufficiently capacious for any purpoſes of viewing objects in water, of any ſort whatſoever. And not only the magnifiers, but the mode of applying them, is nearly the ſame here as in thoſe of the common form. But in this conſtruction, you have both the ſingle and compound aquatic microſcope: for the ſtage GHI being moveable horizontally, and the magnifier at A moving vertically on the joint at D, it is plain, every part of the water in the concave glaſs at H may be brought under it, and the moſt minute objects well enlightened by the concave AB, and ſhewn with great diſtinctneſs.

The other parts of the apparatus are common to all microſcopes. Every body knows the uſe of the ivory ſliders, for holding and applying tranſparent objects as above directed, (fig. 7.). But in fig. 8. you have the form of a braſs ſlider, with ſeveral ſmall glaſs concaves fixed in one ſide, and over them a ſlip of clear plain glaſs is made to ſlide in the frame, and thereby to confine in the hollow of the glaſſes very ſmall living objects, as a flea, louſe, mite, &c. and prevent their crawling out of the field of view.

There is alſo what is called a *bug-box*, conſiſting of two parts: the loweſt contains a large concave; and the upper part contains a plane glaſs, which, being ſcrewed upon the concave, will confine any larger animal, as a bug, an ant, a ſpider, a ſmall fly, &c.

As the circulation of the blood is one of the nobleſt experiments of the microſcope, ſo ample proviſion is made for it by a ſet of glaſs tubes of different ſizes for applying the tranſparent parts of proper objects for that purpoſe, ſuch as ſmall fiſh, tadpoles, and water-newts, the beſt ſubject of all; ſuch a tube is AB (fig. 9.) It being neceſſary to ſtop the open end B, when the animal is in, with a cork, there is a ſmall hole at the other end A to give air to the animal. Theſe tubes are applied to the hole H in the ſtage by two ſteel ſprings on the under part, bent to receive them.

In caſe it be required to view the circulation in the tail of a large fiſh, as a gudgeon, loach, &c. there is an inſtrument of braſs called the *fiſh-pan*, (fig. 10.) contrived of a proper form to hold and confine it; where ABD is the incurved plate to receive the body of the fiſh; CFG is a ribbon to tie the fiſh to the ſaid plate or pan, and is kept tight by a ſpring behind at H. At the end AD, is a long tranſverſe hole or ſlit, over which the tranſparent tail of the fiſh is placed; and then by the ſhank at E, on the under ſide, it is put upon the ſtage thro' a hole at I, and there eaſily adapted to the magnifier A, by moving it every way under the ſame.

It is often required to ſee what many ſmall objects are, and how they are beſt diſpoſed in ſliders, glaſſes, tubes, &c. for which purpoſe there is a hand-magnifier ABC, (fig. 11.) containing a lens of about one inch focal diſtance, to be uſed upon all ſuch occaſions.

Beſides the above particulars, there is a pair of nippers (or forceps) to take up ſmall objects, in order to place them on the ſtage, between the talcs, &c. alſo a camel-hair bruſh, for cleanſing talcs, glaſs, &c. A ſmall wire, with a ſpiral ſcrew at the end, for holding cotton, &c. for cleanſing the glaſs tubes. A little ivory box with ſpare talcs, and wires to faſten them in the ſliders. A piece of ſhammy leather is uſeful upon all occaſions for wiping the glaſſes of every ſort, as it will cleanſe them well without hurting their ſurfaces.

§ 9. *Clark's Improved Pocket Microſcope.*

This is repreſented in Plate CCXX. where ABC DEF (fig. 2. n° 1.) is a box three inches broad, four inches long, and one inch deep, covered with ſhagreen, and having the lid open, which when ſhut is faſtened by claſps as in the figure. This box ſerves for the pedeſtal as well as caſe of the inſtrument. *abcd*, Is a ſolid piece of wood, fixed in the middle of the box; on which is ſcrewed a braſs plate *ef*, having in the middle a female ſcrew for holding the other parts now to be deſcribed.

αβ, n° 2. Is a piece of braſs of the ſhape repreſented in the plate, having a male ſcrew at *α*, anſwering to the female one abovementioned at *g*, and by which this part is firmly fixed upright in the middle of the box. On the lower part of this piece of braſs is faſtened, but in ſuch a manner as to be moveable at the joint *δ*, a ſemicircle of braſs *εε*, in which is a concave ſpeculum *iiii*, ground to a focus of about eight inches: it is moveable in the ring, by means of two pivots; and as the ring itſelf is alſo moveable, it is plain that the ſpeculum may be moved to a proper diſtance from the ſtandard. The face of it is placed next the ſtandard when the inſtrument is put into the caſe, in order to prevent the poliſhed ſurface from injury. *γ* Is a piece of ſolid braſs, which goes into a dovetail ſlit in the part next to be deſcribed, and which Mr Clark calls the *ſtage*. This conſiſts of two pieces, n° 3. One of theſe, *xxxx*, is a parallelogram of braſs, in which the other part *yzyz* ſlides up or down by means of the ſcrew *mn*. From the upper part of this, proceeds at right angles another piece *yzrs*. This is formed of two pieces of braſs riveted at *y* and *z*; and joined to each other at their extremities by the croſs piece *rs*. Upon this ſlides another piece 1, 2, 3, 4, having in it a round hole 5, and which can be made to approach either to *yz* or to *rs* as occaſion requires. This part, by means of the dovetail ſlit at *xx*, may be put on the ſolid piece of braſs at *γ* of the former, and ſecured in a perpendicular poſition on the top of it.

The laſt part of this microſcope is repreſented n° 4. It conſiſts of a ſolid piece of braſs *opqt*, to which is fixed at right angles the piece *opv*; *φ* is a ſmall plane ſpeculum, with the reflecting ſide downwards, and, by means of a joint, capable of being raiſed up or let down as the obſerver finds neceſſary. To the under ſide

Fig. 1.

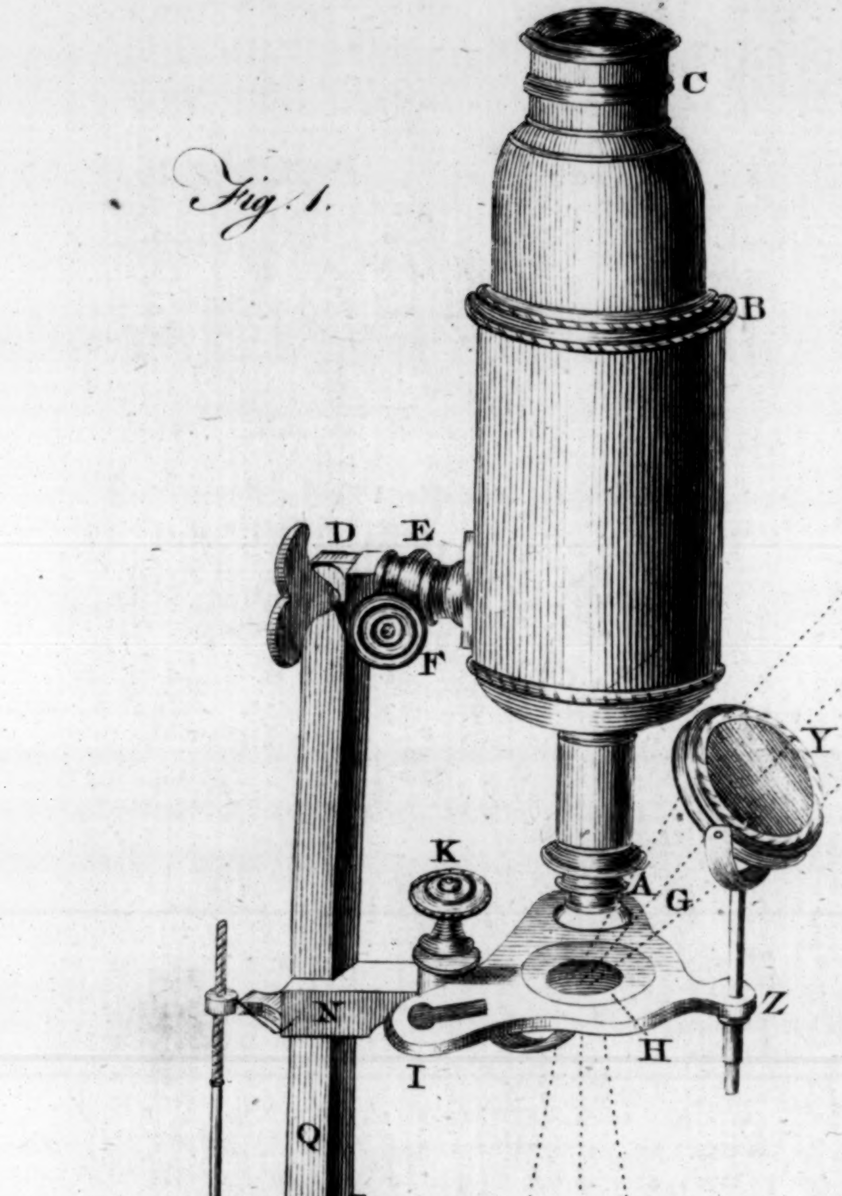

C
B
D
E
F
Y
K
A
G
N
Z
I
H
Q
M
P
O
W
T
R
X
V
S

Fig. 2.

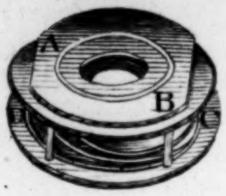


Fig. 3.

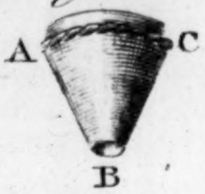


Fig. 4.

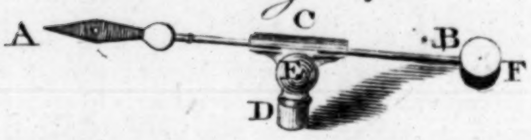


Fig. 6.

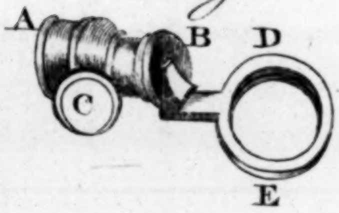


Fig. 5.

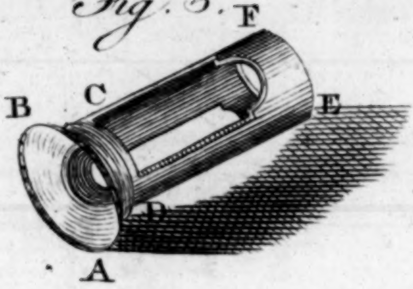


Fig. 8.

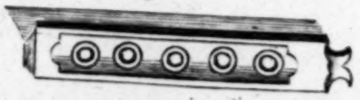


Fig. 7.

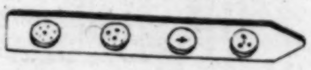


Fig. 10.

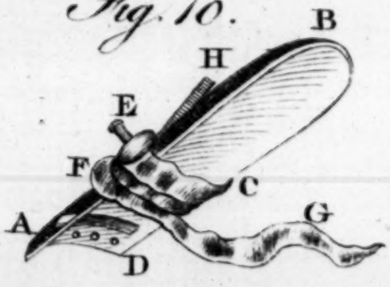


Fig. 9.

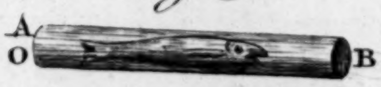
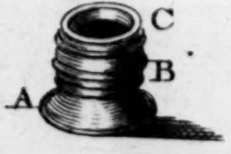


Fig. 11.



A Bell Sculpt.

3 MA 55

ſide of the fore-part of this is placed a ſmall braſs circle, the edges of which appear at ω and λ, and which is fully repreſented in n° 5. Round this circle the magnifiers are diſpoſed, and over againſt each of them is engraved its magnifying power, expreſſed by 1, 2, 3, 4, 5, the higheſt numbers magnifying moſt. This circle is movable; and ſo diſpoſed, that, as it turns round, the magnifiers appear ſucceſſively through the hole at μ, at the ſame time that the power of each is ſhewn by the cipher which appears through the little ſquare hole at 1, n° 4. This whole part of the machine ſlides up and down on the back of the other, by means of a dovetail; and thus, though the part *o p λ v* is always above and parallel to the ſtage, yet it may be brought nearer to it or removed farther off at pleaſure.

On the ſolid back plate are marked the numbers 1, 2, 3, 4, 5, to ſhew the foci of the different magnifiers. Concerning the proper method of uſing this microſcope, Mr Clark gives the following directions.

When the caſe is opened, take out the microſcope, which conſiſts of two ſeparate parts; ſcrew the under part (on which the ſpeculum is) into the braſs plate in the inſide of the caſe, which is the baſe for the inſtrument while in uſe.—Put the other end into the dovetail ſlit behind the handle of the adjuſting ſcrew *m n*, n° 3. place the microſcope ſo as the ſpeculum may front the light; then gently move up the back part by the button for that purpoſe, till the figure 1, on the plate *o p q t*, (n° 4.) appears juſt above the ſtage: then turn round the circular plate which contains the magnifiers, being five in number, till 1 appear in the ſquare hole a-top. Put the ſlider with the objects into the ſtage; give the concave ſpeculum ſuch an inclination as to throw the rays through the object immediately under the magnifier: thereabout diſtinct viſion will be had; if not entirely ſo, a turn or two of the adjuſting ſcrew will either raiſe or depreſs the ſtage, as the eye or object requires: and ſo on with each magnifier and correſponding figure, always taking care that the ſpeculum be in ſuch a ſituation as to throw the light properly up.

The ſlider for opaque objects conſiſts of three diviſions; firſt, ebony, for laying all white or light-coloured objects on, ſuch as ſeeds, ſands, mineral, &c. The ſecond diviſion ivory, for all dark and black bodies. The third diviſion glaſs, which opens and ſhuts; when open, for the circulation of the blood in tadpoles, &c. when ſhut, for confining any live object to be examined, and for all kinds of animalcules in fluids, ſolutions of ſalts, &c. Likewiſe there are on the ſide of the above ſlider, a pair of ſmall forceps, that turn out at pleaſure, to hold any opaque or tranſparent object, ſuch as a fly, ſpider, &c. which may be viewed with the aid of one or both ſpeculums to great advantage. See n° 6.

When this microſcope is employed for examining an opaque object, the upper ſpeculum muſt be bent down to ſuch an angle as to throw the rays reflected from the under ſpeculum upon the opaque object in view: with the ſun or candle-light, thoſe two ſpeculums have a moſt delightful effect. The rays from the under ſpeculum, paſſing through the ſquare opening *y z*, 1, 2, (n° 3.) behind the ſtage, fall on the ſmall upper plane ſpeculum, which, moving on an axis, may be placed in a direction ſo as to illuminate the opaque object with the whole light proceeding from the large concave ſpeculum. In this operation all the magnifiers but n° 5. may be uſed with ſucceſs and ſatisfaction.

§ 10. *Of Extempore Microſcopes.*

For thoſe who cannot conveniently procure the apparatus of any of the above-mentioned microſcopes, it may afford ſome entertainment to try the magnifying power of ſmall globules of water, which in ſome caſes is very conſiderable. The inventor of this method of viewing objects was Mr Stephen Gray, who gives an account of it in the Philoſophical Tranſactions N° 221, 223. "Having obſerved, ſays he, ſome irregular particles within the glaſs globules (for microſcopes), and finding that they appeared diſtinct, and prodigiouſly magnified when held cloſe to my eye; I concluded, that if I conveyed a ſmall globule of water cloſe to my eye, in which there were any opacous or leſs tranſparent particles than water, I might ſee them diſtinctly. I therefore took on a pin a ſmall portion of water, which I knew to have in it ſome minute animals, and laid it on the end of a ſmall piece of braſs wire that then lay by me, about $\frac{1}{10}$ of an inch in diameter, till there was formed ſomewhat more than an hemiſphere of water. Then keeping the wire erect, I applied it to my eye, and, ſtanding at a proper diſtance from the light, I ſaw them and ſome irregular particles, as I had predicted; but moſtly enormouſly magnified. For, whereas they were ſcarce diſcernable by my glaſs microſcope, they appeared within the globule not much different in form, nor leſs in magnitude, than ordinary peas. They cannot be well ſeen by day-light, unleſs the room be darkened; but moſt diſtinctly by candle-light. They may alſo be very well ſeen by the light of the full moon."

But Mr Gray tells us, that theſe little animals will appear more diſtinctly, if drops of water be conveyed by a pin's point into a round hole made in a braſs plate whoſe thickneſs is about one tenth of an inch, and the diameter of the cylindrical hole a little leſs than half a tenth; obſerving to fill it till near an hemiſphere of water be extant on each ſide of it. Now, ſuppoſing the axis of this cylinder of water to be terminated by equal ſpherical ſurfaces, and to be exactly equal to three diameters of the ſpheres of thoſe ſurfaces; in that caſe the little animals ſeen by reflection from the farther ſurface, will appear juſt twice as big in diameter, as if they were placed in the focus of one of thoſe ſpheres of water, and were ſeen thro' it as in common microſcopes. His deſcription of the animalcules thus obſerved is curious. "They are (ſays he) of a globular form, and but little leſs tranſparent than the water they ſwim iu. They have ſometimes two dark ſpots diametrically oppoſite; but theſe are rarely ſeen. There are ſometimes two of theſe globular inſects ſticking together, and the place of junction is opacous: poſſibly they may be in the act of generation. They have a twofold motion; a ſwift progreſſive regular one, and at the ſame time a rotation about their axes, at right angles to the diameter that joins their dark ſpots; but this is only ſeen when they move ſlowly. They are almoſt of an incredible minuteneſs. Mr Leeuwenhoek is moderate enough in his computation, when he tells us that he ſaw inſects in water ſo ſmall that 30,000 of them could ſcarcely equal a grain of coarſe ſand. But I believe it will ſeem a paradox to him when he is told, that he may ſee them by only applying his eye to a portion of water wherein they are contained. I have examined many tranſparent fluids, as water, wine, brandy, vinegar, beer, ſpittle, urine, &c. and do not remember to have found any liquors without theſe inſects. But I have not ſeen many in motion, except in common water that has ſtood, for ſometimes a longer, at others a ſhorter time. In the rivers, after the water has been thickened by rain, there are ſuch infinite numbers of them, that the water ſeems in great part to owe its opacity and whiteneſs to thoſe globules. Rain-water, as ſoon as it falls, has many, and ſnow-water has more of them. The dew that ſtands on glaſs windows has many of them: and for as much as rains and dews are continually aſcending and deſcending, I believe we may ſay the air is full of them. They ſeem to be of the ſame ſpecific gravity with the water they ſwim in; the dead remaining in all parts of the water. Of the many thouſands that I have ſeen, I could diſcern no ſenſible difference in their diameters; they appear of equal bigneſſes in water that has been boiled: they retain their ſhapes, and will ſometimes revive."

Plate CCXXII. fig. 1.

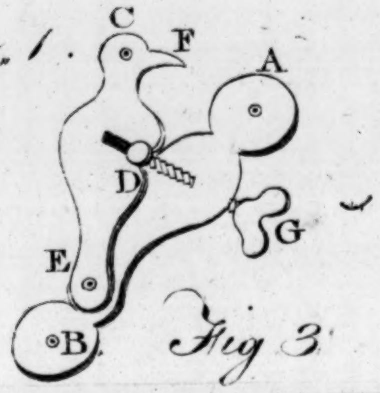
The ſame ingenious author deſcribes another water-microſcope of his own invention, as follows. "AB I call the frame of the microſcope; it may be about $\frac{1}{10}$ of an inch in thickneſs. At A there is a ſmall hole near $\frac{1}{30}$ of an inch in diameter, in the middle of a ſpherical cavity about $\frac{1}{8}$ of an inch in diameter, and in depth ſomewhat more than half the thickneſs of the braſs. Oppoſite to this, at the other ſide of the braſs, there is another ſpherical cavity, half as broad as the former; and ſo deep as to reduce the circumference of the ſmall hole above-mentioned, almoſt to to a ſharp edge. In theſe cavities the water is to be placed, being taken upon a pin or a large needle, and conveyed into them till there be formed a double convex lens of water; which, by the concavities being of different diameters, will be equivalent to a double convex lens of unequal convexities. By this means I find the object is rendered more diſtinct than by a plano-convex of water, or by a double convex formed on the plane ſurfaces of a piece of metal. CDE is the ſupporter whereon to place the object; if it be water, in the hole C; if a ſolid, on the point F. This is fixed to the frame of the microſcope by the ſcrew E, where it is bent upwards, that its upper part CF may ſtand at a diſtance from the frame AB. It is moveable about the ſcrew E as a centre, in order that either the hole C, or the point F, may be expoſed before the microſcope A, and that the object may be brought to, and fixed in its focus. There is another ſcrew, about half an inch in length, which goes through a round plate in the frame of the microſcope AE, the ſcrew and plate taking hold of the ſupporter about D, where there is a ſlit ſomewhat larger than the diameter of the ſcrew. This is requiſite for the admiſſion of the hole C, or point F, according to the nature of the object, into the focus of the watery lens at A. For, by turning the ſcrew G, the ſupporter is carried to or from the ſame; which may be ſooner done, if, while one turns the ſcrew with one hand, the other holds the microſcope by the end B; and one be looking through the water, till the object be ſeen moſt diſtinctly. The ſupporter muſt be made of a thin piece of braſs, well hammered, that, by its ſpring, it may better follow the motion of the ſcrew. I chooſe rather to fix the ſupporter by the ſcrew E, than by a rivet; becauſe it may now, by the help of a knife, be unſcrewed, and, by the other ſcrew G, be brought cloſe to the frame of the microſcope, without weakening its ſpring, and ſo become more conveniently portable. If the hole C in the ſupporter be filled with water, but not ſo as to be ſpherical, all objects that will bear it are ſeen therein more diſtinctly. The hole at B is made for ſeeing animals in water by reflection from its farther ſurface as above deſcribed."

§ 11. *To find the Magnifying Power of Glaſſes employed in Single Microſcopes.*

The apparent magnitude of any object, as muſt appear from what hath been already delivered, is meaſured by the angle under which it is ſeen; and this angle is greater or ſmaller, according as the object is near to or far off from the eye; and of conſequence the leſs the diſtance at which it can be viewed, the larger it wll appear. The naked eye is unable to diſtinguiſhed any object brought exceedingly near it: but looking through a convex lens, however near the focus of that lens be, there an object may be diſtinctly ſeen; and the ſmaller the lens is, the nearer will be its focus, and in the ſame proportion the greater will be its magnifying power. From theſe principles it is eaſy to find the reaſon why the firſt or greateſt magnifiers are ſo extremely minute; and alſo to calculate the magnifying power of any convex lens employed in a ſingle microſcope: For as the proportion of the natural ſight is to the focus, ſuch will be its power of magnifying. If the focus of a convex lens, for inſtance, be at one inch, and the natural ſight at eight inches, which is the common ſtandard, an object may be ſeen through that lens at one inch diſtance from the eye, and will appear in its diameter eight times larger than it does to the naked eye: but as the object is magnified every way, in length as well as in breadth, we muſt ſquare this diameter to know how much it really is enlarged; and we then find that its ſuperficies is magnified 64 times.

Again, ſuppoſe a convex lens whoſe focus is only one-tenth of an inch diſtant from its centre; as in eight inches, the common diſtance of diſtinct viſion with the naked eye, there are 80 ſuch tenths, an object may be ſeen through this glaſs 80 times nearer than with the naked eye. It will, of conſequence, appear 80 times longer, and as much broader, than it does to common ſight; and therefore is 6400 times magnified. If a convex glaſs be ſo ſmall that its focus is only $\frac{1}{20}$ of an inch diſtant, we find that eight inches contains 160 of theſe twentieth-parts; and of conſequence, the length and breadth of any object ſeen through ſuch a lens will be magnified 160 times, and the whole ſurface 25,600 times. As it is an eaſy matter to melt a drop or globule of a much ſmaller diameter than a lens can be ground, and as the focus of a globule is no farther off than a quarter of its own diameter,

Fig. 1.



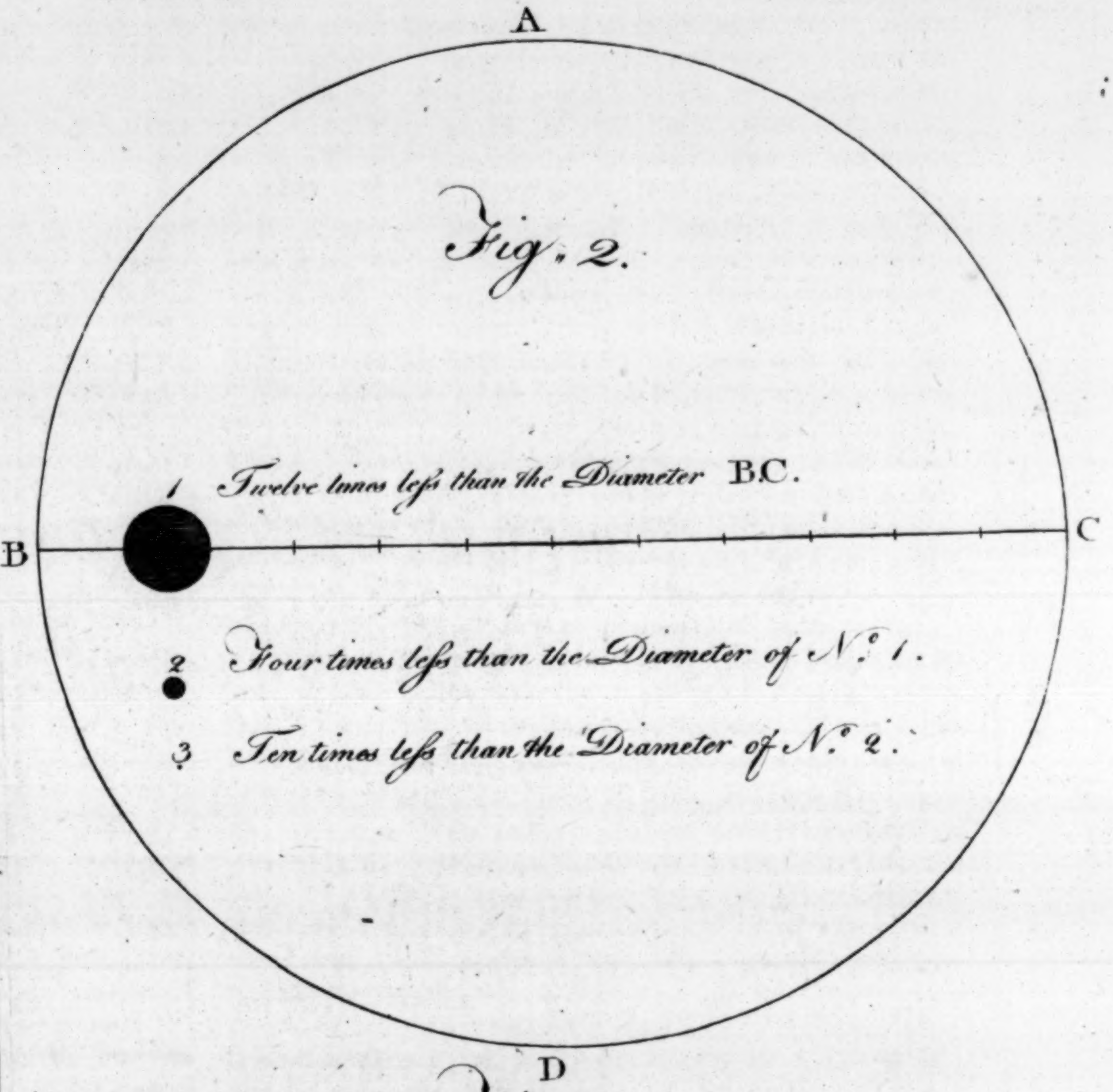

A
Fig. 2.
1 Twelve times less than the Diameter BC.
B
C
2 Four times less than the Diameter of N.° 1.
3 Ten times less than the Diameter of N.° 2.
D

Fig 3.

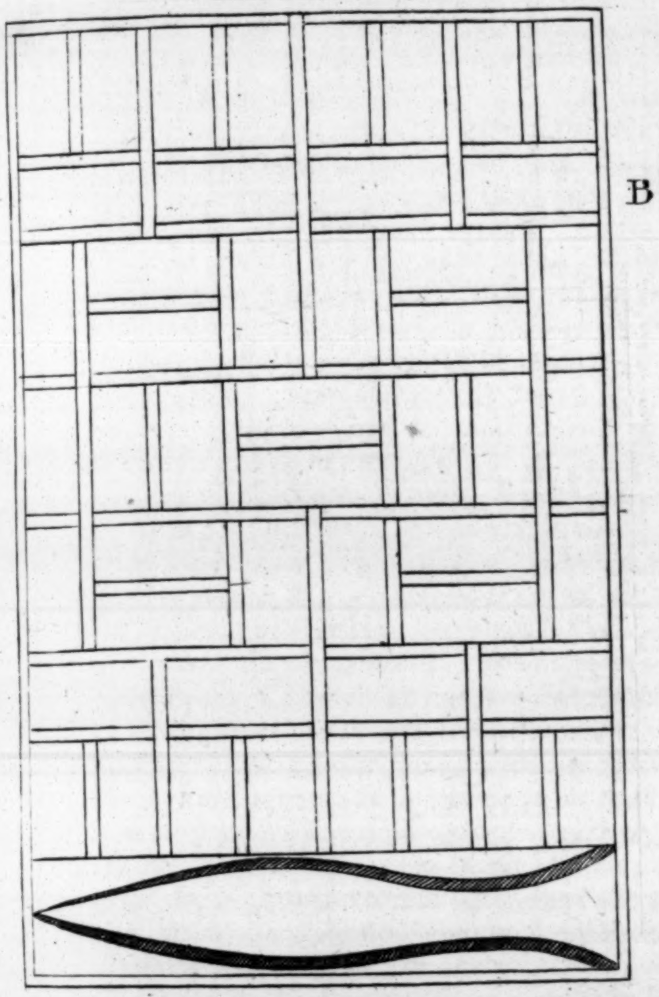


Fig. 4.

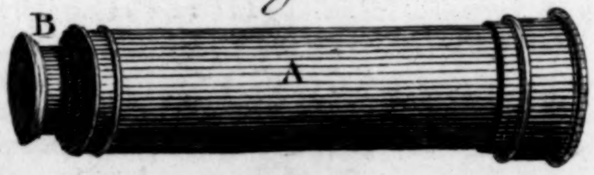
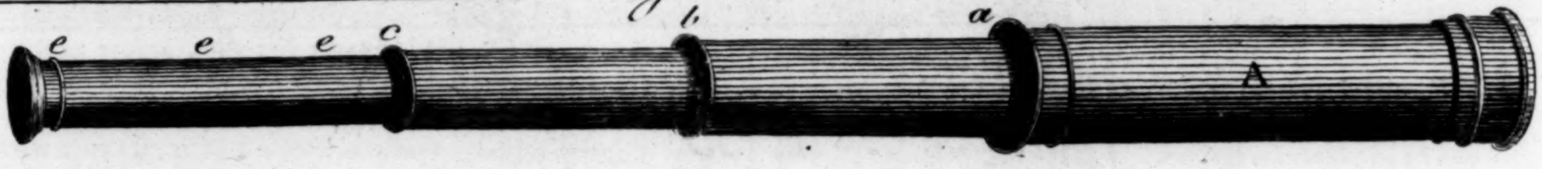


Fig. 5.



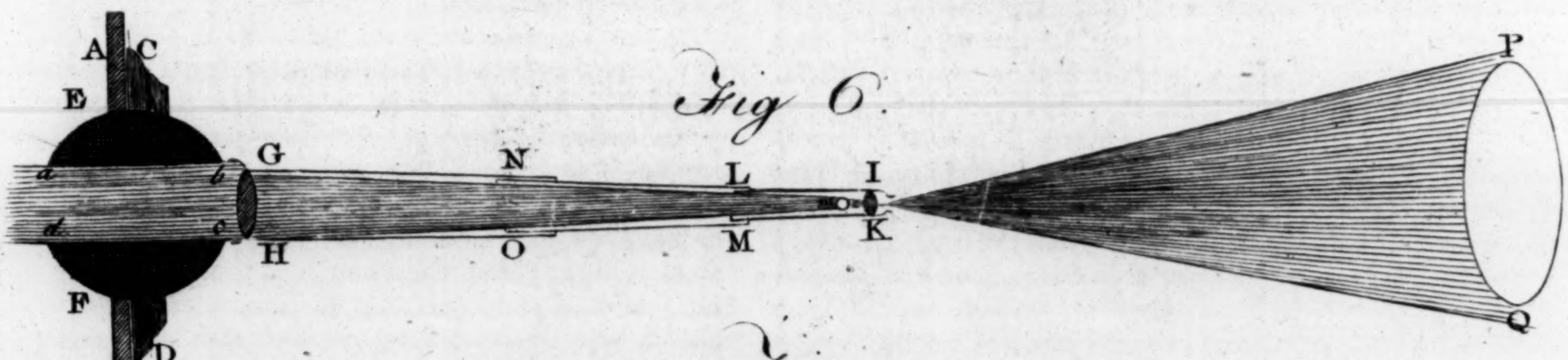
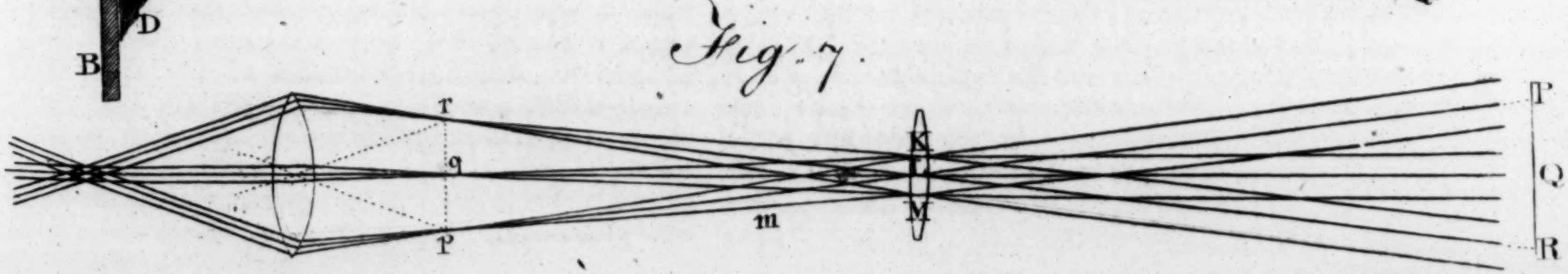

A
C
E
Fig 6.
a
b
G
N
L
I
P
d
c
H
O
M
K
F
D
B
Q

Fig. 7



A Bell Sculpt.

3 MA 53

diameter, it muſt of conſequence magnify to a prodigious degree. But this exceſſive magnifying power is much more than counterbalanced by its admitting ſo little light, want of diſtinctneſs, and ſhewing ſuch a minute part of the object to be examined; for which reaſon, theſe globules, though greatly in vogue ſome time ago, are now almoſt entirely rejected. Mr Leeuwenhoek, as has been already obſerved, made uſe only of ſingle microſcopes conſiſting of convex lenſes, and left to the Royal Society a legacy of 26 of thoſe glaſſes. According to Mr Folkes's deſcription of theſe, they were all exceedingly clear, and ſhewed the object very bright and diſtinct; "which (ſays Mr Folkes) muſt be owing to the great care this gentleman took in the choice of his glaſs, his exactneſs in giving it the true figure, and afterwards, among many, reſerving only ſuch for his uſe as upon trial he found to be moſt excellent. Their powers of magnifying are different, as different objects may require: and as on the one hand, being all ground glaſſes, none of them are ſo ſmall, and conſequently magnify to ſo great a degree, as ſome of thoſe drops frequently uſed in other microſcopes; yet, on the other hand, the diſtinctneſs of theſe very much exceeds what I have met with in glaſſes of that ſort. And this was what Mr Leeuwenhoek ever propoſed to himſelf; rejecting all thoſe degrees of magnifying in which he could not ſo well obtain that end. For he informs us in one of his letters, that though he had, above 40 years by him, glaſſes of an extraordinary ſmallneſs, he had made but very little uſe of them; as having found, in a long courſe of experience, that the moſt conſiderable diſcoveries were to be made with ſuch glaſſes as, magnifying but moderately, exhibited the object with the greateſt brightneſs and diſtinction."

In a ſingle microſcope, if you want to learn the magnifying power of any glaſs, no more is neceſſary than to bring it to its true focus, the exact place whereof will be known by an object's appearing perfectly diſtinct and ſharp when placed there. Then, with a pair of ſmall compaſſes, meaſure, as nearly as you can, the diſtance from the centre of the glaſs to the object you was viewing, and afterwards applying the compaſſes to any ruler, with a diagonal ſcale of the parts of an inch marked on it, you will eaſily find how many parts of an inch the ſaid diſtance is. When that is known, compute how many times thoſe parts of an inch are contained in eight inches, the common ſtandard of ſight, and that will give you the number of times the diameter is magnified: ſquaring the diameter will give the ſuperficies; and, if you would learn the ſolid contents, it will be ſhewn by multiplying the ſuperficies by the diameter.

The ſuperficies of one ſide of an object only can be ſeen at one view; and to compute how much that is magnified, is moſt commonly ſufficient: but ſometimes it is ſatisfactory to know how many minute objects are contained in a larger; as ſuppoſe we deſire to know how many animalcules are contained in the bulk of a grain of ſand: and to anſwer this, the cube, as well as the ſurface, muſt be taken into the account. For the greater ſatisfaction of thoſe who are not much verſed in theſe matters, we ſhall here ſubjoin the following

TABLE of the MAGNIFYING POWERS of CONVEX GLASSES, employed in *Single Microſcopes*, according to the diſtance of their focus: Calculated by the ſcale of an inch divided into 100 parts.

Shewing how many times the DIAMETER, the SUPERFICIES, and the CUBE of an OBJECT, is magnified, when viewed through ſuch glaſſes, to an eye whoſe natural ſight is at eight inches, or 800 of the 100dth-parts of an inch.

			Magnifies the Diameter.	Magnifies the Superficies.	Magnifies the Cube of an Object.	
The focus of a glaſs at	$\frac{1}{2}$, or 50	hundredth-parts of an inch:	16	256	4,096	Times.
	$\frac{4}{10}$, or 40		20	400	8,000	
	$\frac{3}{10}$, or 30		26	676	17,576	
	$\frac{1}{5}$, or 20		40	1,600	64,000	
	15		53	2,809	148,877	
	14		57	3,249	185,193	
	13		61	3,721	226,981	
	12		66	4,356	287,496	
	11		72	5,184	373,248	
	$\frac{1}{10}$, or 10		80	6,400	512,000	
	9		88	7,744	681,472	
	8		100	10,000	1,000,000	
	7		114	12,996	1,481,544	
	6		133	17,689	2,352,637	
	$\frac{1}{20}$, or 5		160	25,600	4,096,000	
	4		200	40,000	8,000,000	
	3		266	70,756	18,821,096	
	$\frac{1}{50}$, or 2		400	160,000	64,000,000	
	1		800	640,000	512,000,000	

The greateſt magnifier in Mr Leeuwenhoek's cabinet of microſcopes, preſented to the Royal Society, has its focus, as nearly as can well be meaſured, at one-twentieth of an inch diſtance from its centre; and conſequently magnifies the diameter of an object 160 times, and the ſuperficies 25,600. But the greateſt magnifier in Mr Wilſon's ſingle microſcopes, as they are now made, has uſually its focus at no farther diſtance than about the 50th part of an inch; whereby it has a power of enlarging the diameter of an object 400, and its ſuperficies 160,000 times.

The magnifying power of the ſolar microſcope muſt be calculated in a different manner; for here the difference between the focus of the magnifier and the diſtance of the ſcreen or ſheet whereon the image of the object is caſt, is the proportion of its being magnified. Suppoſe, for inſtance, the lens made uſe of has its focus at half an inch, and the ſcreen is placed at the diſtance of five feet, the object will then appear magnified in the proportion of five feet to half an inch: and as in five feet there are 120 half-inches, the diameter will be magnified 120 times, and the ſurperficies 14,400 times; and, by putting the ſcreen at farther diſtances, you may magnify the object almoſt as much as you pleaſe; but Mr Baker adviſes to regard diſtinctneſs more than bigneſs, and to place the ſcreen juſt at that diſtance where the object is ſeen moſt diſtinct and clear.

With regard to the double reflecting microſcope, Mr Baker obſerves, that the power of the object-lens is indeed greatly increaſed by the addition of two eye-glaſſes; but as no object lens can be uſed with them of ſo minute a diameter, or which magnifies of itſelf near ſo much as thoſe that can be uſed alone, the glaſſes of this microſcope, upon the whole, magnify little or nothing more than thoſe of Mr Wilſon's ſingle one; the chief advantage ariſing from a combination of lenſes being the ſight of a larger field or portion of an object magnified in the ſame degree.

§ 12. *To find out the real Size of Objects ſeen by Microſcopes.*

Though, by the directions already given, the magnifying powers of microſcopes may be eaſily calculated; yet if we examine extremely minute objects, the real ſize of them will ſtill remain uncertain. For, though we may know that they are magnified ſo many thouſand times, we can by that make but a very imperfect computation of their natural and true ſize; nor indeed can we come to any certain concluſion as to that, but by the mediation of ſome larger object whoſe dimenſions we really know. For as bulk itſelf is merely comparative, the only way we can judge of the bigneſs of any thing is by comparing it with ſomething elſe, and finding out how many times the leſſer is contained in the larger body. The plaineſt and moſt practicable methods of doing this in microſcopical objects are the following.

1. Mr Leeuwenhoek's method of computing the ſize of ſalts in fluids, of the animalcules *in ſemine maſculino*, in pepper-water, &c. was by comparing them with a grain of ſand. By this, however, we muſt underſtand the coarſe ſea-ſand, uſually called *ſcouring-ſand*, which is equal in bigneſs to ſeveral grains of writing ſand. But to make our caculations ſtill more certain, we muſt ſuppoſe them to be of ſuch a ſize, that 100 of them placed in a row ſhall extend an inch in length. Mr Leeuwenhoek then made his calculations in the following manner.

Plate CCXXII. fig. 2.

He viewed thro' his microſcope a ſingle grain of ſand, which we will ſuppoſe to be magnified as the round figure ABCD. Then, obſerving an animalcule ſwimming or running acroſs it, (which ſuppoſe to be of the ſize 1,) conſidering and meaſuring this by his eye, he concludes, that the diameter of this animalcule is only $\frac{1}{12}$ of the diameter of the grain of ſand: conſequently, according to the common rules, the ſuperficies of the grain of ſand is 144 times, and the whole contents 1728 times, larger than the animalcule.

Suppoſe again, that he ſees among theſe another and ſmaller ſpecies of animalcules; one of which, 2, he likewiſe meaſures by his eye, and computes its diameter to be four times leſs than the former: then, according to the foregoing rules, the ſurface of this ſecond animalcule will be 16, and the whole bulk 64, times leſs than the animalcule 1.

If farther, upon a nicer view, he diſcovers a third kind of animalcule, 3, ſo exceedingly minute, that, examining it in the former manner, he concludes the diameter to be 10 times ſmaller than the ſecond ſort; it will then follow, that 1000 of them are only equal in bigneſs to one of that ſort. Hence, of the firſt ſort, 1728 would be contained in a grain of ſand; of the ſecond, 110,592; and of the third, 110,592,000.

In this manner may the comparative ſize of ſmall objects be judged of with tolerable certainty: particularly in the ſolar microſcope; ſince the image of the object and of the grain of ſand, or whatever elſe is thought proper to compare with it, may be really meaſured by a ruler or a pair of compaſſes, and the difference of their diameters moſt exactly found.

2. Mr Hooke deſcribes his method in the following words. "Having rectified the microſcope to ſee the deſired object thro' it very diſtinctly; at the ſame time that I look upon the object thro' the glaſs with one eye, I look upon other objects at the ſame diſtance with my other bare eye: by which means I am able, by the help of a ruler divided into inches and ſmall parts, and laid on the pedeſtal of the microſcope, to caſt as it were the magnified appearance of the object upon the ruler, and thereby exactly to meaſure the diameter it appears of thro' the glaſs; which being compared with the diameter it appears of to the naked eye, will eaſily afford the quantity of its being magnified." This method is recommended by Mr Baker as very good for multitudes of objects; and he declares from his own experience, that a little practice will render it exceedingly eaſy and pleaſant.

3. Another very curious method for this purpoſe is deſcribed by Dr Jurin in his Phyſico-Mathematical Diſſertations. Wind a piece of the fineſt ſilver-wire you can get a great many times about a pin, or ſome other ſuch ſlender body, ſo cloſely as to leave no interval between the wire-threads; to be certain of which, they muſt be carefully examined with a glaſs. Then, with a ſmall pair of compaſſes, meaſure what length of pin the wire covers; and applying the compaſſes with that meaſure to a diagonal ſcale of inches, you will find how much it is; after which, by counting the number of wire-rounds contained in that length, you will eaſily diſcover the real thickneſs of the ſingle wire. This being known, cut it into very ſmall pieces; and, when you examine the object, if it be opaque, ſtrew ſome of theſe wires upon it; if tranſparent, under it; and by your eye compare the parts of the object with the thickneſs of ſuch bits of wire as lie faireſt to the view. By this method, Dr Jurin obſerved, that four globules of human blood would generally cover the breadth of a wire which he had found to be $\frac{1}{485}$th part of an inch; and conſequently

that the diameter of a ſingle globule was $\frac{1}{1940}$th of an inch; which was alſo confirmed by Leeuwenhoek, from obſervations made on the blood with a piece of the ſame wire.

4. Mr Martin in his Optics gives another method ſufficiently eaſy. On a circular piece of glaſs, let a number of parallel lines be carefully drawn, with the fine point of a diamond, at the diſtance of $\frac{1}{40}$th of an inch from each other. If this be placed in the focus of the eye-glaſs of a microſcope, the image of the object will be ſeen upon theſe lines, and the parts thereof may be compared with the intervals: whereby its true magnitude or dimenſions may be very nearly known; for the intervals of theſe lines, tho' ſcarce diſcernible to the naked eye, appear very large thro' the microſcope. A contrivance of this kind may alſo be invented for ſuch microſcopes as a glaſs cannot be applied to in the above manner, by placing it under or behind the object, which will anſwer the ſame purpoſe. Here it will be eaſy to find what proportion an object, or any part thereof, bears to an interval between two lines, and then determine it in parts of an inch: for if the width of an object appears juſt one interval, we ſhall know it to be juſt one fortieth part of an inch; if half an interval, the 80th; if a quarter of an interval, the 160th; if one fifth, only the 200th part of an inch.

5. Dr Smith has an invention ſimilar to this for taking exact draughts of objects viewed in double microſcopes: for he adviſes to get a lattice made with ſmall ſilver wires, or ſmall ſquares drawn upon a plane glaſs by the ſtrokes of a diamond, and to put into the place of the image formed by the object-glaſs. Then, by transferring the parts of the object ſeen in the ſquares of the glaſs or lattice upon ſimilar correſponding ſquares drawn upon paper, the picture thereof may be exactly taken. A micrometer may alſo be applied to microſcopes of the ſame form with thoſe applied to teleſcopes; for by opening the hairs of the micrometer till they exactly correſpond to a certain length, ſuppoſe $\frac{1}{10}$th of an inch, and by obſerving the number of revolutions in this opening, the diameter of any other object, anſwering to a known number of revolutions, may be found by the golden rule.

§ 13. *Of the Field of View in Microſcopes.*

This is always in proportion to the diameter of the lens made uſe of, and its power of magnifying, by which it may be determined: ſince, if the lens is extremely ſmall, it magnifies a great deal, and conſequently a very minute portion of an object only can be diſtinguiſhed thro' it; for which reaſon the greateſt magnifiers never ſhould be employed but for the moſt minute objects. This conſideration will direct to the uſe of ſuch magnifiers as are moſt proper to be employed, which is of the utmoſt conſequence in microſcopical obſervations. On this ſubject Mr Baker gives the following ſhort rule, viz. that the field of view differs not greatly from the ſize of the lens; and that the whole of any object much beyond that ſize, cannot be conveniently viewed thro' it. There is ſome difference, as to the viſible area of an object, as ſeen thro' ſingle or double microſcopes; for the double ſhew a larger portion of it than the ſingle, tho' magnified as much.

§ 14. *Of Microſcopic Objects, and the Method of preparing them for being examined.*

Mr Hooke gives a general account of microſcopic objects under the following denominations, viz. "exceeding ſmall bodies, exceeding ſmall pores, and exceeding ſmall motions." The firſt muſt either be the parts of larger bodies; or things, the whole of which is exceedingly minute, ſuch as ſmall ſeeds, inſects, ſands, ſalts, &c. The ſecond are the interſtices between the ſolid parts of bodies, as in ſtones, minerals, ſhells, &c. or the mouths of minute veſſels in vegetables, the pores in the ſkins, bones, &c. of animals. —Exceeding ſmall motions are the movements of the ſeveral parts or members of minute animals, or the motion of the fluids contained either in animal or vegetable bodies.

Many, as Mr Baker obſerves, even of thoſe who have purchaſed microſcopes, are ſo little acquainted with their general and extenſive uſefulneſs, and ſo much at a loſs for objects to examine by them, that, after diverting themſelves and their friends ſome few times with what they find in the ſliders bought with them, or two or three more common things, the microſcopes are laid aſide as of little farther value; and a ſuppoſition that this muſt be the caſe, prevents many others from buying them: whereas, among all the inventions that ever appeared in the world, none perhaps can be found ſo conſtantly capable of entertaining, improving, and ſatisfying the mind of man.

An examination of objects, in order to diſcover truth, requires a great deal of attention, care, and patience, together with ſome conſiderable ſkill and dexterity, (to be acquired by practice chiefly), in the preparing, managing, and applying them to the microſcope. When any object comes to be examined, the ſize, contexture, and nature of it, ſhould be duely conſidered, in order to apply it to ſuch glaſſes and in ſuch a manner as may ſhew it beſt. The firſt ſtep towards this ſhould conſtantly be, to view it thro' a magnifier that can take in the whole at once: for, by obſerving how the parts lie as to one another, we ſhall find it much eaſier to examine and judge of them ſeparately if there be occaſion. After having made ourſelves acquainted with the form of the whole, we may divide it as we pleaſe; and the ſmaller the parts into which it is divided, the greater muſt be the magnifiers with which we view them.

The tranſparency or opacity of an object muſt alſo be regarded, and the glaſſes made uſe of muſt be ſuited to it accordingly: for a tranſparent object will bear a much greater magnifier than one that is opaque; ſince the nearneſs required in a large magnifier unavoidably darkens an opaque object, and prevents its being ſeen, unleſs by the microſcope contrived on purpoſe for ſuch objects. Moſt objects, however, become tranſparent by being divided into extremely thin or minute parts. Contrivance therefore is requiſite to reduce them into ſuch thinneſs or ſmallneſs as may render them moſt fit for examination.

The nature of the object, whether it be alive or dead, a ſolid or a fluid, an animal, a vegetable, or a mineral ſubſtance, muſt likewiſe be conſidered, and all the circumſtances attended to, that we may apply it in the moſt convenient manner. If it be a living animal,

mal, care muſt be taken to ſqueeze, hurt, or diſcompoſe it as little as poſſible, that its right form, poſture, and temper, may be diſcovered. If a fluid, and too thick, it muſt be thinned with water; if too thin, we muſt let ſome of its watery parts evaporate. Some ſubſtances are fitteſt for obſervation when dry, others again when moiſtened; ſome when freſh, and ſome after being kept a while.

Light is a thing next to be taken care of; for on this the truth of all our examination depends, and a very little experience will ſhew how differently objects appear in one poſition and kind of it, from what they do in another. So that we ſhould turn them every way, and view them in every degree of light, from brightneſs even to obſcurity; and in all poſitions to each degree; till we are certain of their true form, and that we are not deceived. For, as Mr Hooke ſays, it is very difficult, in many objects, to diſtinguiſh between a prominency and a depreſſion, between a ſhadow and a black ſtain; and, in colour, between a reflection and a whiteneſs. The eye of a fly, for inſtance, in one kind of light, appears like a lattice drilled through with abundance of holes; in the ſunſhine, like a ſurface covered with golden nails; in one poſition like a ſurface covered with pyramids, in another with cones, and in other poſitions of quite other ſhapes.

The degree of light muſt be duly ſuited to the object: which if dark, will be beſt ſeen in a full and ſtrong light; but, if very tranſparent, the light ſhould be proportionably weak; for which reaſon there is a contrivance both in the ſingle and double microſcope to cut off abundance of its rays when ſuch tranſparent objects are viewed by the greateſt magnifiers.

The light of a candle, for many objects, and eſpecially ſuch as are exceedingly minute and tranſparent, is preferable to day-light. For others, day-light is beſt; that is, the light of a bright cloud. As for ſun-ſhine, it is reflected from objects with ſo much glare, and exhibits ſuch gaudy colours, that nothing can be determined by it with certainty; and therefore it is to be accounted the worſt light that can be had.

This opinion of ſunſhine, however, muſt not be extended to the ſolar microſcope, which cannot be uſed to advantage without its brighteſt light: for in that way we ſee not the object itſelf, whereon the ſunſhine is caſt, but only the image or ſhadow of it exhibited upon a ſcreen; and therefore no confuſion can ariſe from the glaring reflection of the ſun-beams from the object to the eye, which is the caſe in other microſcopes: but then, in this way, we muſt reſt contented with viewing the true form and ſhape of an object without expecting to find its natural colour, ſince no ſhadow can poſſibly wear the colours of the body it repreſents.

Moſt objects require ſome management in order to bring them properly before the glaſſes. If they are flat and tranſparent, and ſuch as will not be injured by preſſure, the beſt method is to incloſe them in ſliders, between two Muſcovy talcs or iſinglaſs. This way, the feathers of butterflies, the ſcales of fiſhes, the farinæ of flowers, &c. the ſeveral parts and even whole bodies of minute inſects, and a thouſand other things, may very conveniently be preſerved. Every curious obſerver, therefore, will have them always ready to receive any accidental object, and ſecure it for future examination: and a dozen or two of theſe ſliders properly furniſhed are a fine natural hiſtory.

In making a collection of objects, the ſliders ſhould not be filled promiſcuouſly, but care taken to ſort the objects according to their ſize and tranſparency; in ſuch a manner that none may be put together in the ſame ſlider but what may be properly examined by the ſame magnifier: and then the ſlider ſhould be marked with the number of the magnifier its objects are fitteſt for: that is, the moſt tranſparent, or minuteſt objects of all, which require the firſt magnifier to view them by, ſhould be placed in a ſlider or ſliders marked with number I, thoſe of the next degree in ſliders marked with number II, and ſo of the reſt. This method will ſave abundance of time and trouble in ſhifting the magnifiers, which, without ſuch ſortment, muſt perhaps be done two or three times, in overlooking a ſingle ſlider. The numbers marked out upon the ſliders will likewiſe prevent our being at any loſs what glaſs to apply to each. In placing your objects in ſliders, a convex glaſs of about an inch focus, to hold in the hand, and thereby adjuſt them properly between the talcs, before you faſten them down with the braſs rings, will be found very convenient.

Small living objects, ſuch as lice, fleas, gnats, ſmall bugs, minute ſpiders, mites, &c. may be placed between theſe talcs, without killing or hurting them, if care be taken not to preſs down the braſs rings that keep in the talcs, and will remain alive even for weeks in this manner. But if they are larger than to be treated thus, either put them in a ſlider with concave glaſſes intended for that uſe, or in the cell deſcribed above, or elſe examine them ſtuck on the pin or held between the plyers; either of which ways they may be viewed at pleaſure.

If fluids come under examination, to diſcover the animalcules that may be in them, take up a ſmall drop with your pen or hair-pencil, and place it on a ſingle iſinglaſs, which you ſhould have in a ſlider ready, or elſe in one of the little concave glaſſes, and ſo apply it. But in caſe, upon viewing it, you find, as often happens, the animalcules ſwarming together, and ſo exceedingly numerous, that, running continually over one another, their kinds and real form cannot be known; ſome part of the drop muſt be taken off the glaſs, and then a little fair water added to the reſt, will make them ſeparate, and ſhew them diſtinct and well. And this mixture of water is particularly neceſſary in viewing the ſemen maſculinum of all creatures; for the animalcules therein contained are inconceivably minute, and yet crowded together in ſuch infinite numbers, that, unleſs it be diluted a great deal, they cannot be ſufficiently ſeparated to diſtinguiſh their true ſhape.

But if we view a fluid, to find what ſalts it may have in it, a method quite contrary to the foregoing muſt be employed: for then the fluid muſt be ſuffered to evaporate, that the ſalts, being left behind upon the glaſs, may the more eaſily be examined.

Another, and indeed the moſt curious way of examining fluids, is by applying them to the microſcope in exceedingly ſmall capillary tubes made of the thinneſt glaſs poſſible. This was Mr Leeuwenhoek's method of diſcovering the ſhapes of ſalts floating in vinegar, wine, and ſeveral other liquors; and ſuch tubes ſhould be always ready to uſe as occaſion requires.

For the circulation of the blood, frogs, newts, or fiſhes, are commonly made uſe of; and there are glaſs tubes in the ſingle microſcope, and a fiſh-pan as well as tubes in the double one, on purpoſe to confine theſe creatures, and bring the proper parts of them to view: theſe parts, in newts and fiſhes, are the tails, and in frogs the fine filmy membrane between the toes of the hinder legs. Though, if we can contrive to faſten down the creature, and bring our object to the magnifier, the circulation cannot poſſibly be ſeen ſo plainly any where as in the meſentery, or thin tranſparent membrane which joins the guts together; and this part, by pulling out the gut a little, may eaſily be adjuſted to the magnifier.

To diſſect minute inſects, as fleas, lice, gnats, mites, &c. and view their internal parts, requires a great deal of patience and dexterity; yet this may be done in a very ſatisfactory manner, by means of a fine lancet and needle, if they are placed in a drop of water: for their parts will then be ſeparated with eaſe, and lie fair before the microſcope, ſo that the ſtomach and other bowels may be plainly diſtinguiſhed and examined.

We ſhould always have ready for this purpoſe, little ſlips of glaſs, about the ſize of a ſlider, to place objects on occaſionally; ſome of which ſlips ſhould be made of green, blue, and other coloured glaſs, many objects being much more diſtinguiſhable when placed on one colour than on another. We ſhould likewiſe be provided with glaſs tubes of all ſizes, from the fineſt capillaries that can be blown, to a bore of half an inch diameter.

There is, perhaps, no better way of preſerving tranſparent objects in general, than by placing them between clear iſinglaſs in ſliders: but opaque bodies, ſuch as ſands, ſeeds, woods, &c. require different management, and a collection of them ſhould be prepared in the following manner.

Cut cards into ſmall ſlips, about half an inch in length, and one tenth of an inch in breadth: wet them half their length with a ſtrong but very tranſparent gum-water, and with that ſtick on your object. As the ſpots of cards are red and black, by making your ſlips of ſuch ſpots, you will obtain a contraſt to objects of almoſt any colour; and by fixing black things on the white, white on the black, blue or green on the red or white, and all other coloured objects on ſlips moſt contrary to themſelves, they will be ſhewn to the beſt advantage. Theſe ſlips are intended chiefly for the microſcope for opaque objects, to be applied between the nippers: but they will alſo be proper for any other microſcope that can ſhew opaque bodies. A little ſquare box ſhould be contrived to keep theſe ſlips in, with a number of very ſhallow holes in it juſt big enough to hold them. If ſuch holes were cut through that paſteboard of which the covers of books are made, exactly fitted to the box, and a paper paſted on one ſide of it to ſerve for a bottom to it, three or four ſuch paſteboards ſtored with objects might lie upon one another in ſame box, and contain 100 or more ſlips; with objects faſtened on them, always ready for examination. It will not be found amiſs to provide ſome ſlips larger than others, for the reception of different ſized objects. But this will, perhaps, be better underſtood by an inſpection of fig. 3. The box ſhould likewiſe be furniſhed with a pair of pliers, to take up and adjuſt the ſlips, and therefore a convenient place is contrived therein to hold them, as is ſhewn in the figure.

Plate CCXXII.

There is no advantage in examining any object with a greater magnifier than what ſhews the ſame diſtinctly; and therefore, if you can ſee it well with the third or fourth glaſs, never uſe the firſt or ſecond; for the leſs a glaſs magnifies, the better light you will have, the eaſier you can manage the object, and the clearer it will appear. It is much to be doubted, whether the true colours of objects can be judged of when ſeen through the greateſt magnifiers: for as the pores or interſtices of an object muſt be enlarged according to the magnifying power of the glaſs made uſe of, and the component particles of matter muſt by the ſame means appear ſeparated many thouſands of times farther than they do to the naked eye, their reflections of the rays of light will probably be different, and exhibit different colours. And indeed the variety of colouring which ſome objects appear dreſſed in, may ſerve as a proof of this.

The motions of living creatures themſelves, or of the fluids contained within them, as ſeen through the microſcope, are likewiſe not to be determined without due conſideration: for, as the moving body, and the ſpace wherein it moves, are magnified, the motion muſt probably be ſo too; and therefore that rapidity wherewith the blood ſeems to paſs along through the veſſels of ſmall animals muſt be judged of accordingly.

§ 15. *Dollond's Achromatic Teleſcope.*

Mr Dollond's teleſcopes are of two kinds. 1. Thoſe in which only the eye-piece ſlides, ſo as to be drawn out as far as is neceſſary for procuring diſtinct viſion. Of this form are all the larger inſtruments; which are therefore generally fixed upon a ſtand, for viewing objects with greater ſteadineſs.—2. Thoſe which are compoſed of ſeveral ſliding tubes, for the convenience of being put into the pocket.

The uſual method of making the ſliding tubes of teleſcopes has been with paper covered with vellum; but as ſuch tubes have been found liable to ſeveral inconveniencies from being affected by the moiſture of the air, they are now contrived to be made exceedingly thin of braſs, and the outſide of mahogany.

The ſliding tubes are all made to ſtop, when drawn out to the proper length; ſo that, by applying one hand to the outſide tube A, fig. 4. and the other hand to the end of the ſmalleſt tube B, the teleſcope may be, at one pull, drawn out to its whole length, as is repreſented by fig. 5.; then any of the tubes may be ſlipped in a little while you look through, and the object rendered diſtinct to any ſight.

To make the tubes ſlide properly, they all paſs thro' ſhort ſprings or tubes, which are ſcrewed in at *a*, *b*, and *c*, fig. 5. Theſe ſprings may be unſcrewed from the ends of the ſliding tubes by means of the milled edges which project above the tubes, and the tubes taken from one another when required.

There are four convex eye-glaſſes to theſe teleſcopes, whoſe ſurfaces and focal-lengths are ſo proportioned as to render the field of view very large.—Theſe eye-glaſſes are all contained in the ſmalleſt ſliding tube; three of them may be ſeen by unſcrewing the tube at *e e e;* and the fourth, which is at the end of the tube, may be come at by unſcrewing the ſpring at *c*.

Theſe teleſcopes are of three different lengths and ſizes, uſually called 1 foot, 2 feet, and 3 feet.

Length when in Uſe.	Length when ſhut up.	Aperture of the Achromatic Object-glaſs.	Weight.
14 Inches.	5 Inches.	1,1 Inches.	6 Ounces.
28 ditto.	9 ditto.	1,6 ditto.	16 ditto.
40 ditto.	10 ditto.	2,0 ditto.	30 ditto.

The beſt achromatic teleſcopes which Mr Dollond has yet made, are thoſe with a triple object-glaſs of about 45 inches focal diſtance, with an aperture of $3\frac{1}{2}$ inches. Some of theſe magnify the diameters of objects 150 times, with great diſtinctneſs, and light ſufficient for moſt aſtronomical purpoſes. When fitted (for terreſtrial objects) with an eye-piece magnifying about 70 or 80 times, they give moſt agreeable viſion.

The object-glaſs of one of theſe teleſcopes was found to have the following radii (in inches) of curvature for its different ſurfaces, beginning with that next the object, $26\frac{1}{4}$, $37\frac{1}{2}$, $19\frac{7}{12}$, $26\frac{1}{4}$, $26\frac{2}{3}$, $26\frac{2}{3}$. But it does not appear that Mr Dollond and the beſt artiſts abide by a fixed rule in their conſtructions; for teleſcopes of the ſame length and magnifying power, and made by the ſame artiſt, have different conſtructions of the object-glaſs. This may be expected, when we conſider the variable nature of the flint-glaſs. It is probable, that theſe very fine object-glaſſes have been produced by trials *pro re nata* of different curvatures.

Till ſome method can be diſcovered of making flint glaſs free from veins, which differ in their refracting power, it is not probable that larger teleſcopes than thoſe now mentioned will be produced.

§ 16. *Of the Newtonian Reflecting Teleſcope.*

Plate CCXXIII.

Fig. 1. ſhews one of thoſe teleſcopes made by the Hon. Samuel Molyneux, and preſented by him to king John V. of Portugal. ABC repreſents a triangular board or table ſupported by the globe D, and by the annexed carvings and maſks, and which ſerves for the baſis or pedeſtal of the inſtrument. Upon occaſion this board may be taken off by unſcrewing three iron ſcrews, the heads of which lie near the three volutes at the three corners. At E is repreſented a ſmall key or handle which turns ſome wheel-work, concealed under the board of the table, and which ſerves to give an horizontal circular motion to the pillar F placed in the middle, and to the ſuperincumbent tube HIKL. If this ſhould ever be out of order by taking off the upper board, it may be rectified. At G is repreſented another handle which gives the tube its perpendicular motion; ſo that while the obſerver ſits with his right ſide applied to the ſide of the table AC at the end C, by turning the two handles E and G, he can give the tube any required elevation or azimuth, and thereby follow the motion of the heavenly bodies very commodiouſly.

The teleſcope itſelf conſiſts of two metalline ſpecula and an eye-glaſs, which are to be duely placed in the tube HIKL left open at the end HL. The large concave ſpherical ſpeculum *i k* is to be placed within the tube at IK; in which are fixed three ſtops, or bits of wood, againſt which the poliſhed ſurface of the ſpeculum being applied, the axis of reflection will fall exactly in the axis of the tube. In the braſs plate which cloſes this end of the tube, there are three ſcrews intended for holding the metal in this ſituation; but many cautions are requiſite with regard to this metal and the placing of it. In the firſt place, it is never to be touched, but by ſcrewing into the backſide of it a handle *l*, which fits the hole therein. In the next place, great care muſt be taken not to breathe on it, or to expoſe it to damp air. If any thing of that kind happens, it muſt be wiped thoroughly dry with a linen cloth before a fire; and it may be ſometimes in like manner cleaned with a rag wetted in ſpirit of wine; provided the ſpirit be not left to evaporate, for that would leave an humid ſediment which would hurt the poliſh. In the third place, unleſs when in uſe, it ſhould be conſtantly kept with its face downwards on a piece of plane glaſs made on purpoſe.

The ſpeculum is a portion of a concave ſphere whoſe diameter is about eight feet eight inches, and which of conſequence collects the rays into a focus about 26 inches diſtant from its ſurface. The laws of reflection are ſuch, that any error in the figure of this ſpeculum will produce about ſix times as great an irregularity in the picture formed in its focus, as the like irregularity would cauſe in a common refracting teleſcope. It hath been found by experiment, that an error of leſs than 1000th part of an inch is capable of vitiating its figure; ſo that great care muſt be taken in placing the metal in the tube for uſe, againſt the three ſtops above-mentioned; and that the three ſcrews at IK be gently ſcrewed, only juſt ſufficient to bear the metal truly againſt the ſtops; for the ſmalleſt exceſs of ſtreſs in the ſcrews againſt the back of the metal may diſtort and very much damage its figure. There is alſo a piece of wood *m*, having a round hole *p* in it, and carrying a ſmall braſs arm *n*, which holds the other ſmaller ſpeculum *o*, which is plane. This ſpeculum muſt be always preſerved from the air when out of uſe. When the teleſcope is to be uſed, the cover of the ſmall ſpeculum muſt firſt be taken off; then place it in the tube at the hole M, which exactly fits the above-ſaid ſquare piece. Preſs it in pretty tight and true; which, if duely performed, the centre of the ſmall ſpeculum will be placed in the axis of the large concave one, and will reflect the parallel rays which enter at the open end HL, to the round hole *p* in the ſaid ſquare piece, in which hole one of the two eye-glaſſes in its cell *q* is to be placed; and then the inſtrument is prepared for uſe. The obſerver is therefore to place himſelf at the ſide of the tube, and to look in at M, where he will ſee the images of the objects which lie at his left-hand. In taking out or putting in the little ſpeculum at *o*, great care muſt be uſed to avoid ſhaking or bending the arm; for the ſmalleſt accident of that kind will certainly diſorder its ſituation. There are three ſcrews at the back, the middlemoſt of which fixes it to the arm *m n;* the other two only preſs upon the back, and ſerve to adjuſt

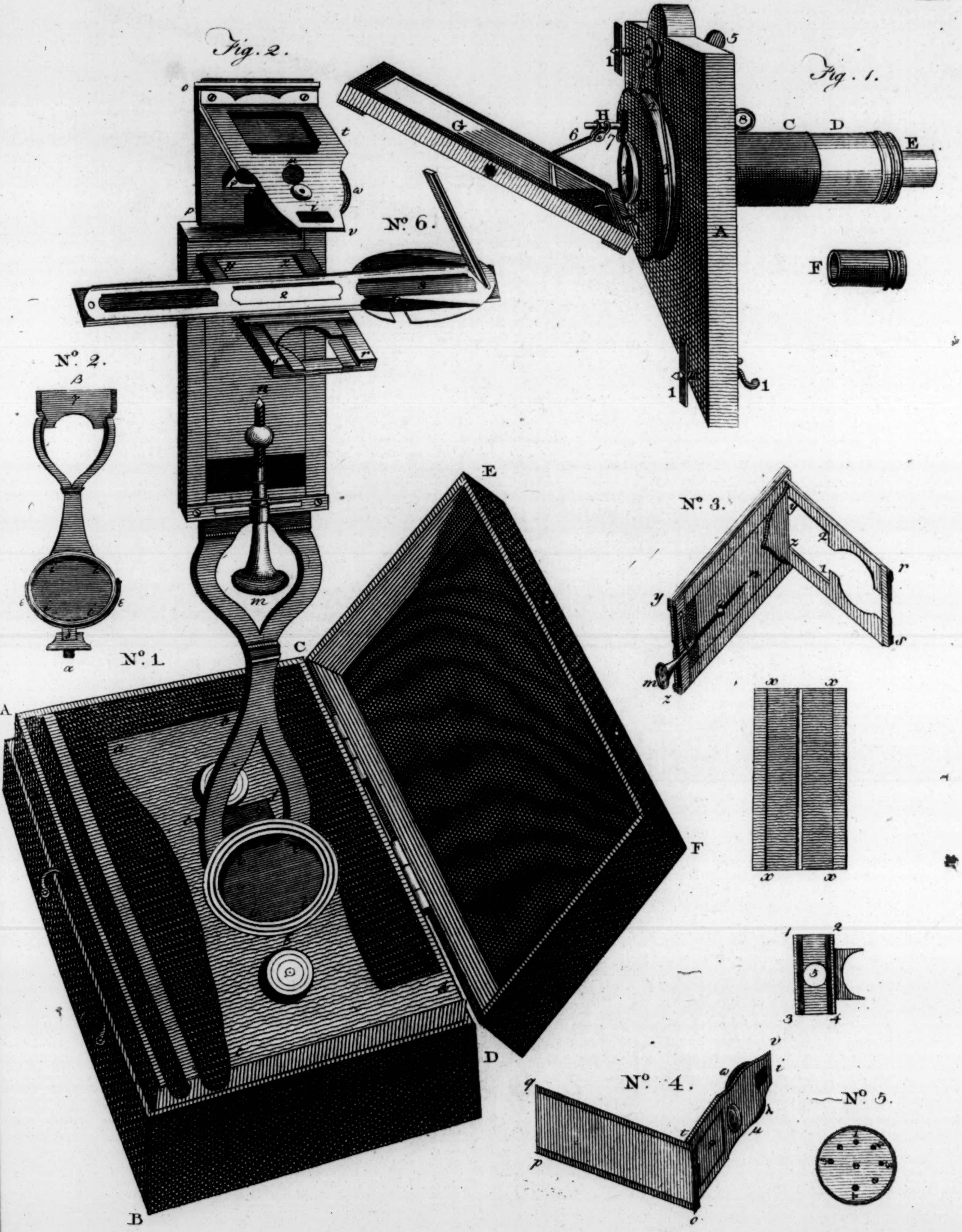


Fig. 1.
5
1
H
6
7
8
C
D
E
G
A
F
1
1
Fig. 2.
o
t
u
w
p
v
y
x
2
3
r
n
m
Nº. 6.
Nº. 2.
β
γ
ε
ε
α
Nº. 1.
A
B
C
D
E
F
Nº. 3.
y
z
r
s
m
z
x
x
x
x
1
2
3
4
Nº. 4.
q
p
o
t
v
i
w
λ
μ
Nº. 5.

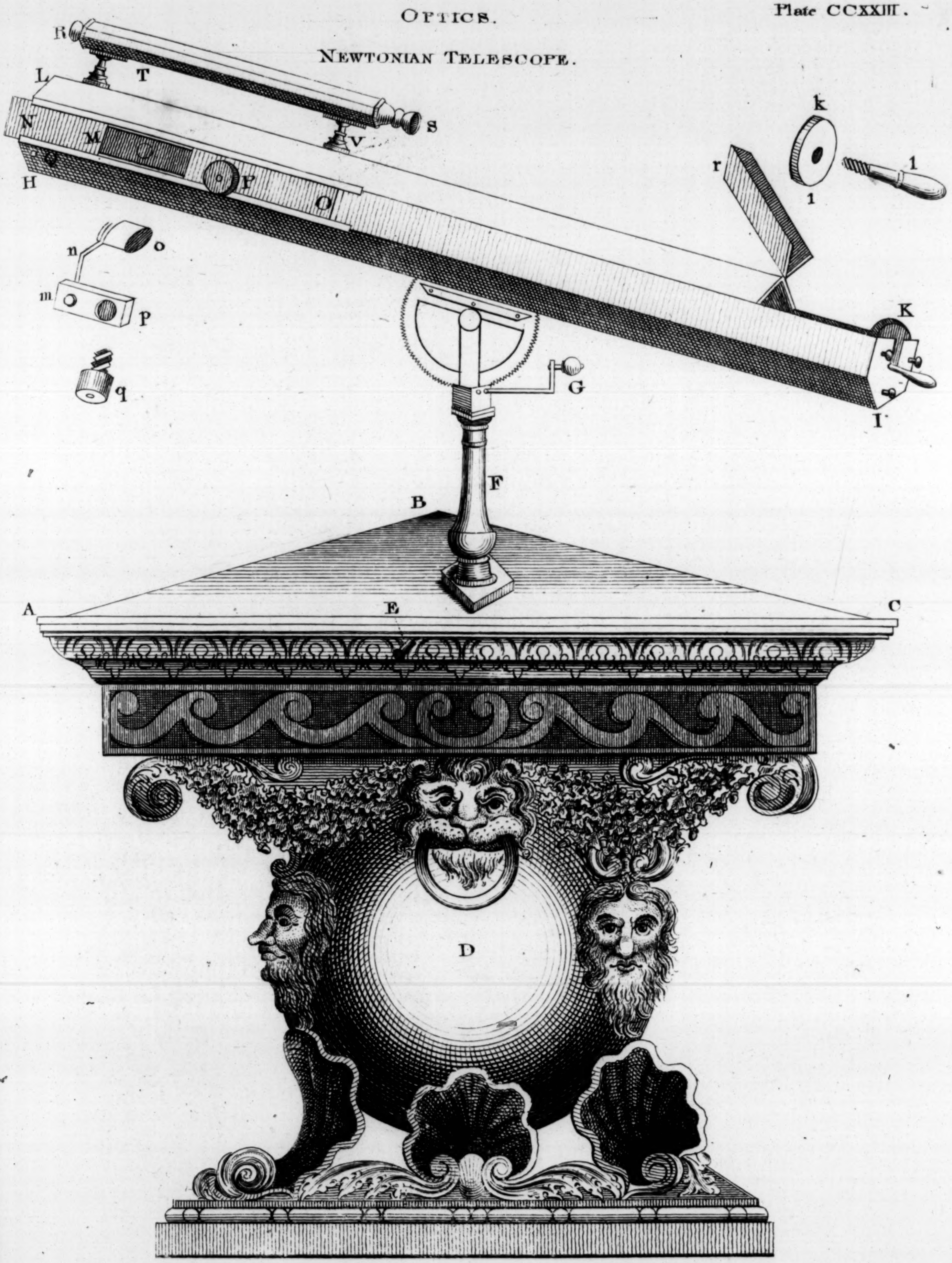
A Bell Sculp.

3 MA 53

OPTICS.

Plate CCXXIII.

NEWTONIAN TELESCOPE.


R
L
T
S
N
M
V
H
P
O
r
k
1
1
n
o
m
p
q
K
G
I
F
B
A
E
C
D

A.Bell Sculp.t

3 MA 53

juſt its ſituation to an exact angle of 45° with the axis of the great ſpeculum. There are two eye-glaſſes, whereof the one that hath the largeſt aperture being made uſe of, th einſtrument will magnify as much as a common refracting teleſcope of about 20 or 22 feet long; and with the eye-glaſs that hath the ſmalleſt apertures, it will magnify as much and as diſtinctly as one of 35 or 40 feet.

At P ſtands a round button of ivory; and at Q is repreſented a ſmall pin of ivory, which may be ſeen with a ſmall white thread fixed to it, at the end of the tube H. This thread at the other end is fixed in the inſide of the tube; and towards the middle of it, it is wound once round the inward end of the ivory button P. From this diſpoſition, by turning round the ivory button P, the whole ſlider of black ebony wood NO, with the ſmall ſpeculum and the eye-glaſs applied at M, may be made to approach to or recede from the large ſpeculum at the other end IK: and by this means its true diſtance, and the diſtinct appearance of the object, muſt be found, for various diſtances of the ſame object, and for the various eyes of different obſervers; which variety in different perſons, from the great magnifying power of the eye-glaſs in this inſtrument, will be conſiderably more ſenſible than in a refracting teleſcope. But the true diſtance of the ſpecula will immediately be found in all caſes, by turning this ivory pin P backwards and forwards very ſlowly and gently; and, for celeſtial objects, the true diſtance being once found for the obſerver's eye, a ſmall mark may be made acroſs the ſlider, and upon the edge of the tube, to bring it ſpeedily, and without any difficulty, to its proper place at another time. By the little ivory pin at Q, the ſtring may be tightened or relaxed to make the ſlider NO move moſt eaſily as occaſion requires. Either of the eye-glaſſes being applied in the cylindrical hole *p*, in the ſquare piece *mp*, may alſo be made to approach to or recede from the focus, by turning round the ſmall tube *q* in which they are inſerted, the outſide whereof is wrought into a fine ſcrew for that purpoſe. Diſtinct viſion may alſo by that means be obtained for different eyes, without moving the whole ſlider NO.

RS repreſents a ſmall refracting teleſcope, whoſe axis is parallel to the axis of the reflector. In its focus there are placed two croſs-hairs, and its only uſe is to find out any object more readily by the reflector. The eye being applied at S, turn the two handles at E and G, till the point of the object to be viewed in the reflector falls exactly on the croſs-hairs; then the eye applied at M to the reflector, will ſee the ſame object diſtinctly; with this caution, that as the whole inſtrument with its baſis can eaſily be moved, the moſt convenient ſituation for the obſerver will be to keep the tube HI nearly at right angles to the ſide AC, and to ſit with the ſide AC flat againſt his right ſide near C, as hath been already mentioned. And in finding the object at firſt with the ſmall refracting teleſcope, it is moſt convenient to ſtand at the corner of the table C. The handle G, may be inſerted at either ſide of the pillar F, as convenience ſhall require. At the ſmall pillars TV, which ſupport and hold the ſmall teleſcope RS, there are ſome ſmall ſcrews near T, which being relaxed, the direction of the tube RS way be altered horizontally by puſhing the tube with the hand ſidewiſe, either way, as occaſion requires, and then tightening the ſcrews again. And at V there are ſcrews and a ſpringing piece of braſs, which, being relaxed or tightened, will in like manner alter its elevation, ſo as to reſtore the paralleliſm of the tubes in caſe of any accident that may have diſturbed them. In making obſervations, it will be found convenient not to touch the table, but only to move the handles, as the motions of the ſtar or other celeſtial body direct; for in an inſtrument that magnifies ſo much, the leaſt motion or trembling is magnified proportionably.

In this teleſcope Dr Smith takes notice of a remarkable deception; namely, that, when the reflector is compared with a refracting teleſcope of equal magnifying power, the obſerver always imagines that the latter has the advantage. For this he does not pretend to account, but looks upon it to be an optical deception common to all mankind.

§ 17. *The Gregorian Reflecting Teleſcope.*

Plate CCXXIX.

This is repreſented, fig. 16. O is a three-footed pedeſtal of wood or metal, in the middle of which is faſtened, by means of the large ſcrew R, the ſtand AB. On the top of this ſtand is faſtened the plate CD, having in it a ſocket to receive the braſs ball D. This plate is compoſed of two parts; and by means of the ſcrews L, M, the ſocket is tightened or looſened on the ball, ſo that it can either allow it a free motion, or keep it firm in its place. This ball is fully ſhewn at fig. 17.; and, with its ſtalk F, is ſoldered into the piece of braſs FG, which is again faſtened on the body of the teleſcope by means of the ſcrews HI. The whole length of the teleſcope is repreſented by *ab*; the eye-piece, or the part which contains the eye-glaſſes, by *ar*; the other part, containing the ſpecula, is repreſented by *cb*. Fig. 4. and 5. ſhew the proportional ſize of the two ſpecula to one another. The larger is placed at *c*, in the ſame manner and with the ſame precautions as have been already mentioned with regard to the Newtonian teleſcope; the other is placed on a ſhort arm within the tube, in ſuch a manner, that it occupies exactly the middle of it: and by means of a rod *rpqmo*, having the upper end of it turned into a ſcrew, the little ſpeculum can be removed from the other, or brought nearer to it, as occaſion requires. In the eye-piece, *ar*, are two eye-glaſſes, which receive the light reflected from the little ſpeculum; and the eye being applied at *a*, the obſerver ſees thoſe objects which are placed directly before the mouth of the tube.

The following are the proportions of an excellent Gregorian teleſcope, made by Mr James Short of Edinburgh, which may ſerve as a model for calculating others of any given length.

	Inches.
Focal diſtance of the larger ſpeculum —	9.6
Its breadth or aperture — —	2.3
Focal diſtance of the leſſer ſpeculum —	1.5
Its breadth —— ——	0.6
Breadth of the hole in the larger ſpeculum	0.5
Diſtance between the leſſer ſpeculum and the next eye-glaſs —— ——	14.2
Diſtance between the two eye-glaſſes —	2.4
Focal diſtance of the eye-glaſs next the metals —— ——	3.8
Focal diſtance of the eye-glaſs next the eye —— ——	1.1

This teleſcope was found by experiment to magnify

60 times in diameter, and to take in an angle of 19′ to the naked eye; and of conſequence the magnified angle was equivalent to 19°.

For finding the magnifying power of a teleſcope by experiment, Dr Smith tells us, that the following method was purſued by Mr Hauksbee, Mr Folkes, and Dr Jurin. Having fixed a paper circle of one inch diameter upon a wall, at the diſtance of 2674 inches from the eye-glaſs of the teleſcope, they viewed it in the teleſcope with one eye, while, with the other eye naked, they viewed two parallel lines drawn upon paper, 12 inches aſunder, moving them gradually to and fro, till they appeared to touch two oppoſite points of the circle ſeen in the teleſcope; and then the perpendicular diſtance of the lines was found to be 132 inches. In this poſition of the objects, the angle at the eye made by the rays that came from the extremities of the diameter of the one-inch circle, was equal to the angle ſubtended at the other eye by the 12-inch interval of the parallel lines; and therefore the ratio of this angle to that which the ſaid circle would ſubtend at the naked eye, viewing it at the ſaid diſtance of 2674 inches, is the magnifying power of the teleſcope; and is compounded of the direct ratio of the ſubtenſes of theſe angles, and the inverſe ratio of the diſtances of the ſubtenſes from the eye; that is, of 12 to 1, and of 2674 to 142: which make the ratio of 226 to 1, very nearly.

Suppoſing a larger paper circle had been placed at ſo great a diſtance, that its picture might have been formed by the ſpeculum in its principal focus; the teleſcope would have magnified it more than our one-inch circle, in the ratio of the diſtance of this latter circle from the principal focus, to its diſtance from the centre of the ſphere of the ſpeculum: becauſe the diameter of the picture of the remoter circle would have been greater, in this ratio, than that of the one-inch circle, ſuppoſing theſe circles to ſubtend the ſame angle at the centre of the ſpeculum. But this ratio, in the preſent experiment, being only 2674 to 2671, gives only an inconſiderable increaſe to the magnifying power already determined.

Thus we have an eaſy and accurate method of examining the goodneſs of a teleſcope of any kind. Firſt, by giving it the leaſt eye-glaſs that will ſhew the new moon, or rather Jupiter and Saturn, with ſufficient light and diſtinctneſs when the air is quiet and pure; and then by finding how much it magnifies by the method abovementioned. But if ſeveral teleſcopes of the ſame kind have nearly the ſame length, thoſe are the beſt in their kind with which you can read a print at the greateſt diſtance. That the reader may have ſome notion of the powers of teleſcopes in this way, we ſhall ſubjoin a ſhort account of the effects of ſome reflectors made by Mr James Short of Edinburgh, as related by Mr Maclaurin.

With a reflecting teleſcope, of which the ſpeculum was quick-ſilvered glaſs, and focal diſtance 15 inches, the Philoſophical Tranſactions could eaſily be read at the diſtance of 230 feet; by another of the ſame dimenſions, the Tranſactions could be read at 280 feet diſtance. By a teleſcope of the ſame kind, whoſe focal diſtance was nine inches, Mr Maclaurin read in the Tranſactions at the diſtance of 138 feet; and another much ſmaller print at the diſtance of 125 feet. It is not mentioned whether theſe teleſcopes were of the Newtonian or Gregorian form; though it is moſt probable that they were of the former kind.

As the light produced by theſe glaſs ſpeculums was very faint, Mr Short next applied himſelf to the conſtruction of metallic ones, and the effects of theſe were vaſtly greater; but as they were of the Gregorian form, it is doubtful whether we are to aſcribe their ſuperiority entirely to the uſe of metalline ſpeculums, or to the more advantageous conſtruction of them. Theſe teleſcopes had focal diſtances of two inches and 6 10ths; of four inches; ſix, nine, and 15 inches. By thoſe of four inches, the ſatellites of Jupiter were ſeen very diſtinctly; and he could read the Philoſophical Tranſactions at above 125 feet diſtance. By thoſe of ſix inches focus, he read at 160 feet diſtance; by thoſe of 9 inches, he read at 220 feet diſtance; and by thoſe of 15 inches, he was able to read the Tranſactions at 500 feet diſtance. With theſe laſt he alſo ſeveral times ſaw the five ſatellites of Saturn. The effects of theſe 15-inch teleſcopes of Mr Short's therefore were equal to thoſe of the beſt 17-feet refractors ever known; for it was thought wonderful that Caſſini ſhould obſerve all the ſatellites of Saturn with a 17-feet refracting teleſcope.

§ 18. *The Solar Teleſcope.*

Plate CCXXII.

THIS inſtrument is of the nature of the camera obſcura, and ſhews the image of the ſun in a darkened room, as that of an inſect is ſhewn by the ſolar microſcope. AB, fig. 6. repreſents a part of the window-ſhutter of a darkened room; CD the frame, which, by means of a ſcrew, contains the ſcioptric ball EF, in a hole of the ſaid ſhutter adapted to its ſize. This ball is perforated with a hole *abcd*. Through the middle, on the ſide *bc*, is ſcrewed into the ſaid hole a piece of wood, and in that is ſcrewed the end of a common refracting teleſcope GHIK, with its object-glaſs GH, and one eye-glaſs at IK; and the tube is drawn out to ſuch a length, that the focus of each glaſs may fall near the ſame point. This being done, the teleſcope and ball are moved about in ſuch a manner, as to receive the ſunbeams perpendicularly on the lens GH, through the cylindric hole of the ball: by this glaſs they will be collected all in one circular ſpot *m*, which is the image of the ſun. The lens IK is to be moved nearer to, or farther from, the ſaid image *m*, as the diſtance at which the ſecondary image of the ſun is to be formed requires, which is done by ſliding the tube IKLM backward and forward in the tube LMNO. Then of the firſt image of the ſun *m*, will be formed another, PQ, very large, luminous, and diſtinct.

In this manner the ſun's face may be viewed at any time without offence to weak eyes; and whatever changes happen herein may be duely obſerved. The ſpots are here all of them conſpicuous, and eaſy to be obſerved under all their circumſtances of beginning to appear, increaſe, diviſion of one into many, &c. By the ſolar teleſcope alſo we view an eclipſe of the ſun to the beſt advantage; as having it by this means in our power to repreſent the ſun's diſk as large as we pleaſe, and conſequently to render the eclipſe proportionably conſpicuous. Alſo the circle of the ſun's diſk may be ſo divided by lines and circles drawn thereon, that the quantity of eclipſe, eſtimated in digits, may

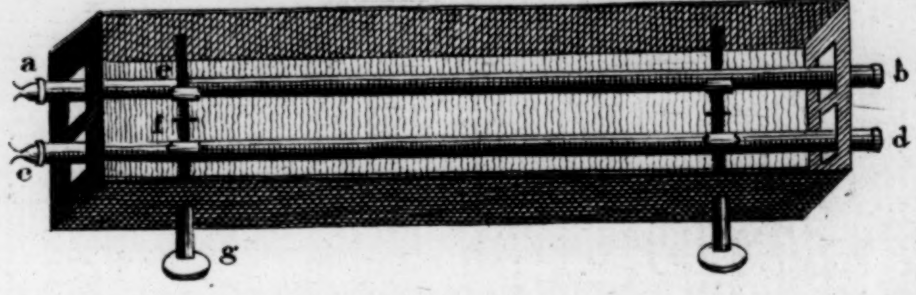
3 MA 53

OPTICS.

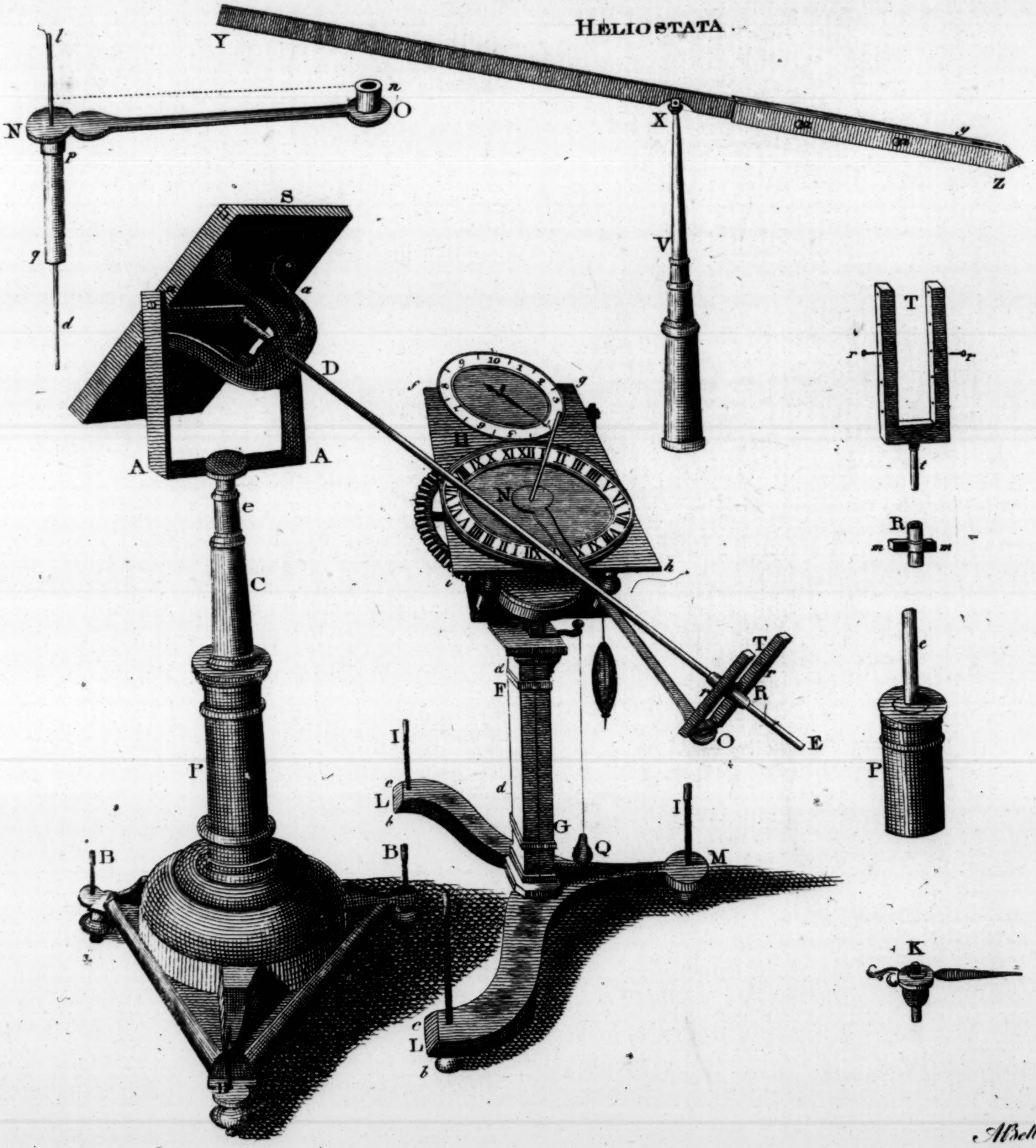
Plate CCXXIV.

Fig. 1.

Binocular Telescope.



HELIOSTATA.


Y
l
n
N
O
p
X
y
Z
S
q
a
d
D
V
T
r
r
f
g
A
A
H
e
N
R
m
m
C
i
h
d
F
T
r
R
O
E
e
I
c
L
b
d
P
P
B
B
G
Q
I
M
K
c
L
b

A. Bell Sculp.

this way be moſt exactly determined; alſo the moments of the beginning, middle, and end of it, for determining the longitude of the place. The tranſits of Mercury and Venus over the ſun are thus alſo beautifully repreſented, and the planets appear very round, black, and well-defined. Their comparative diameters with that of the ſun may alſo be thus obſerved, the times of ingreſs and egreſs, &c. better than by any other method hitherto invented.

By the ſolar teleſcope the clouds are moſt beautifully repreſented paſſing before the ſun, according to their various degrees of rarity or denſity; but theſe, Mr Martin ſays, are beſt obſerved by the camera obſcura. He takes notice of an unuſual phenomenon which he once obſerved in looking at the image of the ſun by this inſtrument. The window looked towards the weſt, and the ſpire of Chiceſter cathedral was directly before it at the diſtance of about 50 or 60 yards. The images of the ſun and ſpire were very large, being made by a lens of 12 feet focal diſtance, and it was very agreeable to obſerve the manner in which the ſun was for ſome time eclipſed by the ſpire. Once, as he obſerved the occultation of the ſun behind the ſpire, juſt as the diſk diſappeared, he ſaw ſeveral ſmall, bright, round balls, running towards the ſun from the dark part of the room, even to the diſtance of 20 inches. Their motion was a little irregular, but rectilinear, and ſeemed accelerated as they approached the ſun. Theſe luminous globules alſo appeared on the other ſide of the ſpire, and preceded the ſun, running out into the dark room, ſometimes more, ſometimes leſs together, in the ſame manner as they followed the ſun at its occultation. "They appeared, ſays he, to be in general about $\frac{1}{10}$ of an inch in diameter; and therefore muſt have been very large luminous globes in ſome part of the heavens, whoſe light was extinguiſhed by that of the ſun, ſo that they appeared not in open day-light; but whether of the meteor kind, or what ſort of bodies they might be, I could not conjecture."

§ 19. *The Helioſtata.*

THE uſe of this machine is to take off the inconveniencies which ariſe from the motion of the earth, in making experiments on the ſolar light. By this motion it happens, that the image of the ſun formed by the ſolar teleſcope can never be ſteady, but continually ſhifts its place on the ſcreen upon which it is thrown; and the like may be ſaid of the ſolar microſcope. Any contrivance therefore by which this apparent motion can be prevented, and the light of the ſun fixed upon any particular ſpot, or in one certain direction, muſt certainly be of the higheſt utility. The helioſtata anſwers the purpoſe completely; and is an invention of Dr 'sGraveſande, who gives the following deſcription of it.

"This machine conſiſts of two principal parts, each of which conſiſts of many ſmaller parts. The firſt is a plane metallic ſpeculum, ſupported by a ſtand; the other is a clock, which directs the ſpeculum.

"We make uſe of a metallic ſpeculum, becauſe there is a double reflection in a glaſs one. The magnitude and figure of it are not material; mine is rectangular, four inches long and three broad.

"This is put into a wooden frame, which is ſurrounded with wooden rulers, cut in, whereby the ſpeculum is retained.

Plate CCXXIV. fig. 2.

"To ſuſtain this, without hindering its motion, to the ſaid wooden frame, behind, is applied the braſs plate *a a*, whoſe ends, being bent, are faſtened to the wood ſidewiſe.

"This ſpeculum S is ſuſpended by the handle AA, ſmall ſcrews being put through holes in the end of it, which go into the ends *a*, *a*, of the ſaid frame, and whoſe parts, which are in the holes of the handle, are cylindrical, ſo that the ſpeculum turns freely upon its axis, which, if it were made ſenſible, would paſs along the ſurface of the ſpeculum.

"The handle is joined to the cylinder C, whoſe axis, if it were continued, would concur with the middle point of the ſaid axis of the revolution of the ſpeculum.

"To the ſame point anſwers the tail DE, which is joined perpendicularly to the hind part of the ſpeculum. This tail is cylindrical; and is made of a braſs wire, which is ſtraight, firm, and whoſe diameter is about a ſixth part of an inch.

"The cylinder C is put upon the wooden ſtand P, whoſe upper part is repreſented by itſelf: whilſt this is done, the iron cylinder *e*, whoſe ſurface is ſmooth, goes into a cavity in the cylinder C, which is of copper; by which means this turns freely about its axis, ſo that, by the motion of the tail DE, the poſition of the ſpeculum is very eaſily altered as you pleaſe.

"This is raiſed and depreſſed, by means of the three braſs ſcrews B, B, B, which are turned with a key, and go through a plate of the ſame metal, which is applied to the bottom of the ſtand for that purpoſe; and which ſtands out in three places, to receive the ſcrews.

"If the ſpeculum is to be raiſed higher, as may eaſily be done, we put the ſpeculum together with its ſtand, upon a ſmall board, which has low feet, and is made for that purpoſe.

"The other part of the machine is a clock, as has been ſaid above. This is repreſented at H; the index performs its revolution in 24 hours.

"The plane of the clock is inclined to the horizon, according to the inclination of the equator in the place where the machine is made uſe of; that is, in this our city of Leyden is 37° 49′.

"But this machine may be made uſe of in other places, whoſe latitudes differ one or two degrees from this place, as will appear.

"The clock is ſuſtained by the copper pillar FG; this conſiſts of two parts, which are joined by the ſcrews *d*, *d*, between which, as in a ſheath, is moved an iron plate, in the middle of which there is a ſlit, through which the ſaid ſcrews *d*, *d*, paſs. This plate is joined faſt to the lower plate of the clock itſelf, which is raiſed and depreſſed by this method, and faſtened by the ſcrews *d d*. It may alſo be raiſed higher by the ſcrews I, I, I, which go thro' the thick copper plate LLM, upon which the pillar FG ſtands.

The extreme parts of this plate L, L, are terminated in ſuch manner, that *b c* and *c b* make one right line, through which we ſuppoſe a vertical plane to paſs: this will be perpendicular to the horizontal lines, which may be drawn on the plane of the clock; ſuch as are *fg*, *hi*.

“The machine is ſo ordered, that the plane of the clock may have the inclination beforementioned, when the plane LLM is horizontal; in which ſituation it is eaſily placed by means of the ſcrews I, I, I, by help of the plumb-line Q, whoſe point ſhould anſwer to the point *o*, which is marked upon the ſurface LLM.

“If the machine were to be uſed in another place, whoſe latitude differed from that for which the machine was conſtructed, another point, as *o*, would to be marked, in which caſe the plane LLM would be inclined to the horizon.

“The axis of the wheel, which moves the index, is pretty thick, and is perforated cylindrically; but the cavity inclines a little to a conical figure, for towards the bottom it is ſomewhat narrower.

“The index itſelf is repreſented at ON. This is of braſs, and its tail *pq* exactly fills the cavity mentioned laſt, into which it is thruſt tight, that it may ſtick, and that the wheel may carry the index with it as it moves; whoſe ſituation may yet be altered, and ſet to any hour.

“This tail has alſo a cylindrical hole; and through this paſſes the ſmall braſs wire *ld*, which remains in any ſituation, whilſt it is raiſed or depreſſed.

“At the end O of the index there is a ſmall cylinder *n*, which is perforated cylindrically.

“The length of the index is meaſured in the line, perpendicular to *ld*, drawn from the axis of the cylinder *n* to the axis of the wire *ld*. In my machine this length is ſix inches.

“The iron tail *t* of the piece T goes into the cavity of the cylinder *n*; this tail exactly fills the cavity, but yet moves freely in it.

“Between the legs of the piece T, the ſmall pipe R may be ſuſpended at different heights, thro' which the tail DE of the ſpeculum may be moved freely, which fills the pipe very exactly. This ſmall pipe is ſuſpended, as was ſaid of the ſpeculum. The ſmall ſcrews *r*, *r*, paſs through the ſaid legs, and the ends of them go into the parts *m*, *m*, of the pipe, and remain there: then the pipe turns freely about the axis which paſſes through *mm*; for the parts of the ſmall ſcrews are cylindrical, which anſwer to the holes in the legs of the piece T.

“When the machine is to be fixed, we make uſe of another machine, which we ſhall call a *placer*.

“The cylinder C, together with its ſpeculum, is removed from the ſtand P, upon which is placed the braſs pillar VX. This ſticks tighter to *e* than the cylinder C, that the pillar may keep its place, whilſt the machine is ſettled.

“Upon the head X the ruler YZ moves round a centre, ſo that it may be inclined to the horizon as you pleaſe, and keep its poſition. The length of the arm YX is determined at pleaſure. The arm XZ is of a peculiar conſtruction, and a certain length.

“To the ſaid ruler, which is not extended beyond *y*, there are applied two others, as *x*Z, between which the firſt is incloſed: theſe are joined at Z, and alſo cohere by means of the ſcrews *z*, *z*, which paſs thro' a ſlit in the firſt ruler. On this ruler is marked the ſmall line *vx*, whoſe length is equal to nine hundredth-parts of the length of the index, and which is divided in the manner which will be mentioned preſently.

“The arm XZ is equal to the length of the index, if it be meaſured between the centre of motion at X and the end Z, when the end *x* of the outward ruler agrees to *v*, where the diviſions of the ſmall line *vx* begin.

“The diviſions of this ſmall line are unequal, and determine the length of the arm at different times of the year, by applying *x* to the diviſion which anſwers to the day in which the machine is uſed.

“But in order to mark the diviſions, we ſuppoſe the length of the arm to be divided into 1000 equal parts, that is, *vx* into 90 equal parts; but the diſtances from the point *v* are ſet down in the following ſmall table.

21 Mar.	1 Mar.	21 Fe.	11 Fe.	1 Fe.	21 Ja.	11 Ja	21 Dec.
0.	8.	17.	32.	47.	64.	77.	90.
21 Sept.	11 Oct.	21 Oc.	1 No.	11 No.	21 No.	1 Dec.	21 Dec.

“On the oppoſite ſide of the ruler, there is alſo drawn a ſmall line, which accurately anſwers to *vx*, whoſe diviſions are contained in this ſecond ſmall table.

21 Mar.	11 Ap.	21 Ap.	1 May	11 May	21 May	1 Jun.	21 Jun.
0.	11.	22.	36.	51.	66.	79.	90.
21 Sep.	1 Sep.	21 Au.	11 Au.	1 Au.	21 Jul.	11 Jul.	21 Jun.

“Theſe things being thus ordered; to fix the machine, it is put upon a plane that is horizontal, or nearly ſo.

“Firſt we join the placer to the ſtand P, which we raiſe as much as is neceſſary, that the ruler YZ being reduced to a juſt length, which we turn at pleaſure, and incline in every reſpect, that is with reſpect to the place and direction, may agree to the ſun's ray, which we undertake to fix.

“We ſo order the other part of the machine, that the lines *bc*, *bc*, may agree to a meridian line which has been drawn on the plane; and it is ſo diſpoſed by means of the ſcrews I, I, I, that the plumb-line Q may anſwer to the point *o*.

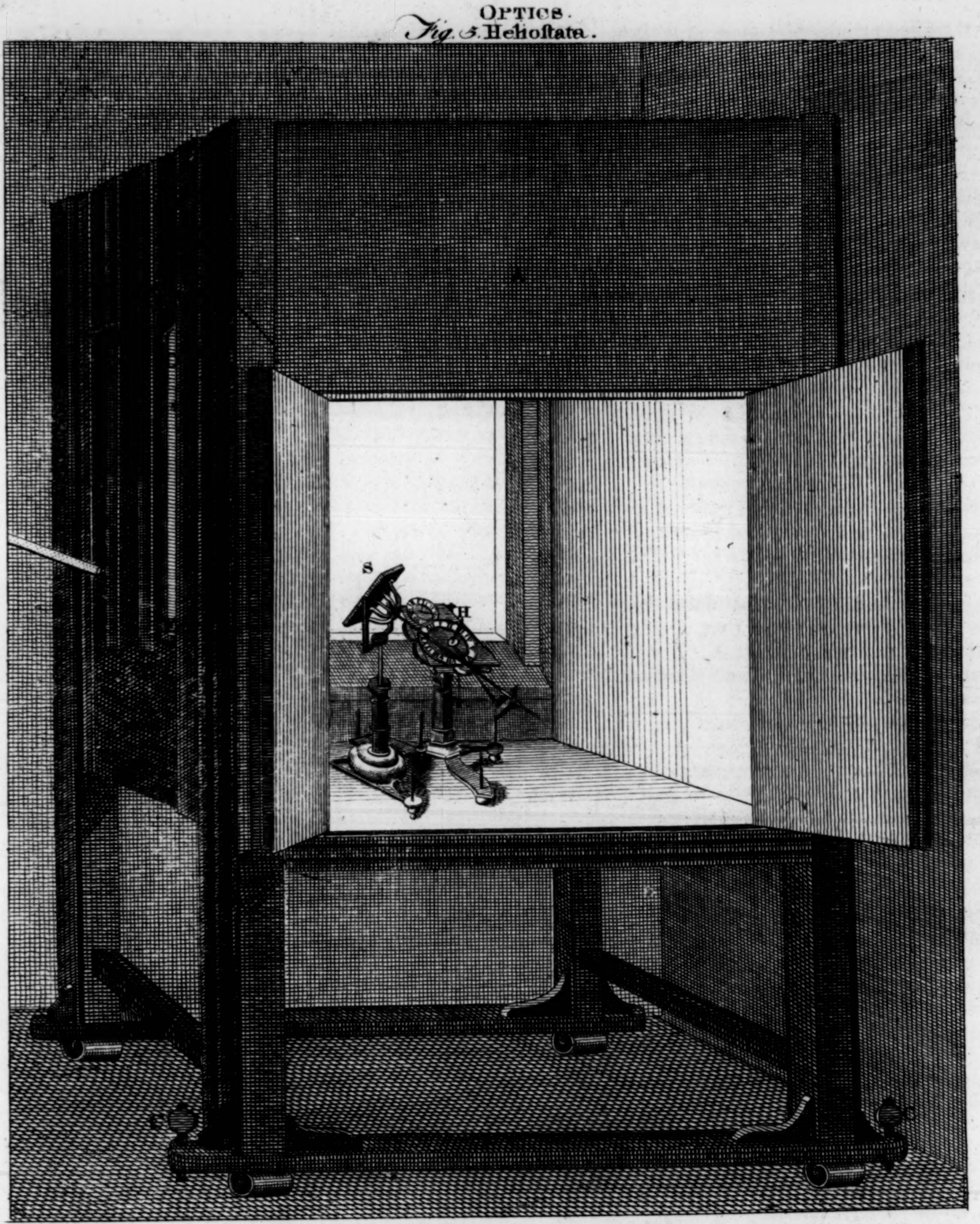
“The index NO is turned, that the ſun's rays may paſs directly thro' the pipe R, which is turned and inclined, as is required. The braſs wire *ld* is then raiſed or depreſſed, that the ſhadow of the end of it *l* may paſs through the middle of the pipe.

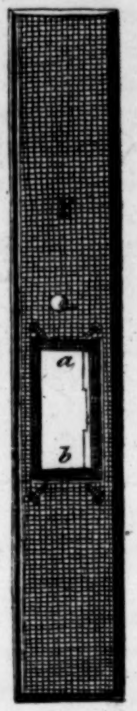
“This whole part is moved to the placer, which is ordered as has been ſaid before. But the clock is ſo moved towards the placer, and raiſed, that the end *l* of the braſs wire *lk* may agree to the end Z of the ruler YZ.

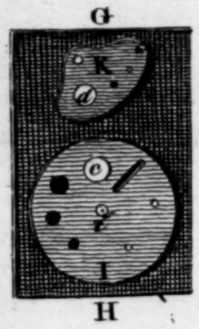
“We muſt continually have regard to the plummet Q, that it may always anſwer to the point *o*; we muſt alſo take care, that after the clock is moved, the ſun's rays and the ſhadow of the point *l* may paſs thro' the

3 MA 53

Fig. 5. Heliostata.







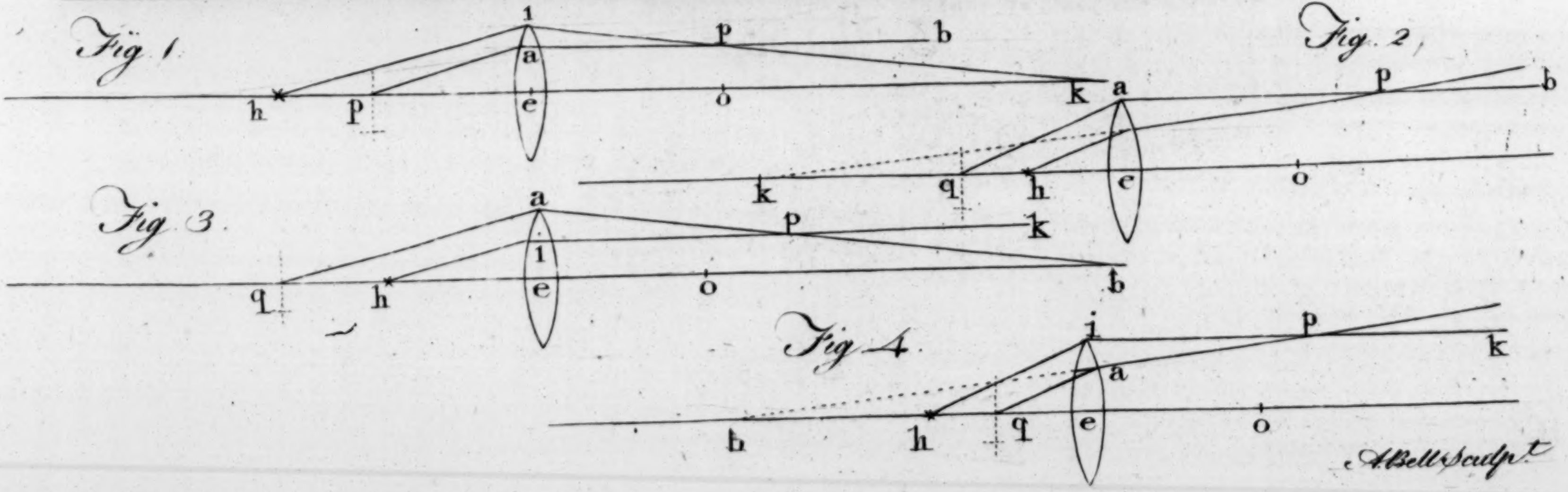


Fig. 1.
i
p
b
a
h
p
e
o
k
Fig. 2.
a
p
b
k
q
h
e
o
Fig. 3.
a
p
k
i
q
h
e
o
b
Fig. 4.
i
p
k
a
h
h
q
e
o

A.Bell Sculpt.

the ſmall pipe R as before, that the poſition with reſpect to the meridian may not be diſturbed.

“ The pillar VX with its ruler YZ is removed, the ſtand P being left in its place, on which the cylinder C with its ſpeculum is put. The piece T is taken out of its place, that the tail DE of the ſpeculum may be put thro' the pipe R; when the piece T is put in the ſame place again, every thing is ready.

“ Then the rays reflected from the middle of the ſpeculum, to which all the other rays, reflected from the ſpeculum, are parallel, agree, as to place and direction, with the poſition which the ruler of the placer had; and whilſt the tail of the ſpeculum is moved, as the clock moves, whoſe index follows the ſun, its ſituation is altered with reſpect to the ſun; but the ray, reflected from the middle point of the ſpeculum, remains fixed.

“ If the index NO being taken away, we ſubſtitute the index K, the machine may be uſed as a common clock.

“ The experiments concerning light muſt be made in the dark; for this reaſon the machine, when made uſe of in the experiments, muſt be ſhut up in a box or caſe.

Plate CCXXV. fig. 5.

“ This caſe is repreſented at A; it ſtands upon feet that have rollers joined to them, that it may be eaſily moved. It is open at one end, which end is moved to a window, through which the ſun's rays come freely to the ſpeculum.

“ But the box is every way larger than the window, that, by being applied cloſe to the wall, the light may be hindered from entering into the chamber; to this end, the box is moved as near the wall as poſſible, and the ſcrews C, C, which are faſtened to the fore-feet, are turned till they touch the ground.

“ The door in my machine is oppoſite to the window; it might have been otherwiſe diſpoſed. We tranſmit the rays through the fore part B; we make choice of this, by reaſon of the make of the place in which the experiments concerning light were made. In this part there are two apertures three inches broad, and about 18 inches high, one of which is repreſented open at DE.

“ Theſe are cloſed on the outſide by pieces of wood, which are moveable between wooden rulers. Each piece ſerves either aperture, that they may be changed. One of them F is three feet long, and has a hole in its middle. The aperture *a b* is five inches long, and two broad.

“ This is cloſed by the copper plate GH, in which there are two holes, *c, d;* the diameter of that is two thirds of an inch, the diameter of this is leſs. Theſe holes are ſtopped by the plates I and K, which are applied to the firſt plate GH, and are moveable about the centres *i* and *k:* the magnitudes of the holes may alſo be varied, by turning the laſt plates, as the figure ſhews.

“ The board F is hollowed behind, in order to receive the object-glaſs of a teleſcope of 16, 20 or 25 feet, according to the magnitude of the place in which the experiments are made; the centre of this glaſs ought to anſwer to the centre of the hole *c*.

“ This board F is pretty long; the holes of the ſmall plate may anſwer to any part of the aperture of the box, the other part of the aperture remaining ſhut. For this reaſon the ſecond board is ſhorter; it is ſufficient if the aperture be cloſed with this. Theſe boards are faſtened by the ſcrews M, M.

“ We have ſhewn how the box is to be applied to the window; but this cannot be done thus, if we would make the experiments in the hours in which the ſun's rays enter the window very obliquely. In this caſe, that the rays may come to the ſpeculum, the box muſt anſwer to a part of the window only; the remaining part is cloſed any other way: I make uſe of a curtain to exclude all the ſun's rays.”

§ 20. *Equatorial Teleſcope, or Portable Obſervatory.*

The Equatorial Teleſcope was contrived by Mr James Short; and conſiſts of two circular planes or plates AA, ſupported upon four pillars; and theſe again ſupported by a croſs-foot or pedeſtal moveable at each end by the four ſcrews BBBB. The two circular plates AA are moveable, the one above the other, and called the *horizontal plates*, as repreſenting the horizon of the place; and upon the upper one are placed two ſpirit-levels, to render them at all times horizontal: theſe levels are fixed at right angles to each other. The upper plate is moved by a handle C which is called the *horizontal handle*, and is divided into 360°, and has a nonius index divided into every three minutes.—Above this horizontal plate is a ſemicircle DD, divided into twice 90°, which is called the *meridian ſemicircle*, as repreſenting the meridian of the place; and is moved by a handle E, called the *meridian handle*, and has a nonius index divided into every three minutes. Above this meridian ſemicircle is faſtened a circular plate, upon which are placed two other circular plates FF, moveable the one upon the other, and which are called the *equatorial plates;* one of them, repreſenting the plane of the equator, is divided into twice twelve hours, and theſe ſubdivided into every ten minutes of time. This plane is moved by a handle G, called the *equatorial handle*, and has a nonius index for ſhewing every minute. Above this equatorial plate there is a ſemicircle HH, which is called the *declination ſemicircle*, as repreſenting the half of a circle of declination, or horary circle, and is divided into twice 90°, being moved by the handle K, which is called the *declination handle*. It has alſo a nonius index, for ſubdividing into every three minutes. Above this declination ſemicircle is faſtened a reflecting teleſcope LL, the focal length of its great ſpeculum being 18 inches.

In order to adjuſt this inſtrument for obſervation, the firſt thing to be done is to make the horizontal plates level by means of the two ſpirit-levels, and the four ſcrews in the croſs pedeſtal. This being done, you move the meridian ſemicircle, by means of the meridian handle, ſo as to raiſe the equatorial plates to the elevation of the equator in the place, which is equal to the complement of the latitude, and which, if not known, may alſo be found by this inſtrument. By this teleſcope the following problems may be ſolved.

To find the Hour of the Day, and Meridian of the Place. Firſt find, from the aſtronomical tables, the ſun's declination for the day, and for that particular time of the day; then ſet the declination ſemicircle to the declination of the ſun, taking particular notice whether it is north or ſouth, and ſet the declination ſemicircle

circle accordingly. You then turn about the horizontal handle and the equatorial handle, both at the ſame time, till you find the ſun preciſely concentrical with the field of the teleſcope. If you have a clock or watch at hand, mark that inſtant of time; and by looking upon the equatorial plate and nonius index, you will find the hour and minute of the day, which comparing with the time ſhewn by the clock or watch, ſhews how much either of them differ from the ſun.

In order to find the meridian of the place, and conſequently to have a mark by which you may always know your meridian again, you firſt move the equatorial plate by means of the equatorial handle, till the meridian of the plate, or hour-line of 12, is in the middle of the nonius index; and then by turning about the declination handle till the teleſcope comes down to the horizon, you obſerve the place or point which is then in the middle of the field of the teleſcope, and a ſuppoſed line drawn from the centre of this field to that point in the horizon, in your meridian line. The beſt time of the day for making this obſervation for finding your meridian, is about three hours before noon, or as much after it. The meridian of the place may be found by this method ſo exactly, that it will not differ from the true meridian above 10″ in time; and if a proper allowance be made for refraction at the time of obſervation, it will be ſtill more exact. The line thus found will be of uſe afterwards, as being the foundation of all aſtronomical obſervations.

To find a Star or Planet in the Day-time. The inſtrument remaining rectified as already directed, you ſet the declination ſemicircle to the declination of the ſtar or planet you want to ſee; and then you ſet the equatorial plate to the right aſcenſion of the ſtar or planet at that time; and looking through the teleſcope, you will ſee the ſtar or planet: and having once got it into the field of the teleſcope, you cannot loſe it again; for as the diurnal motion of a ſtar is parallel to the equator, by moving the equatorial handle ſo as to follow it, you will at any time, while it is above the horizon, recover it, if it is gone out of the field.

The eaſieſt method for ſeeing a ſtar or planet in the day-time is this: Your inſtrument being adjuſted as before directed, you bring the teleſcope down, ſo as to look directly at your meridian mark; and then you ſet it to the declination and right aſcenſion, as before mentioned. By this inſtrument moſt of the ſtars of the firſt and ſecond magnitude have been ſeen even at noon-day, when the ſun was ſhining very bright; as alſo Mercury, Venus, and Jupiter. Saturn and Mars are not ſo eaſily ſeen, on account of the faintneſs of their light, except when the ſun is but a few hours above the horizon.

And in the ſame manner, in the night-time, when you can ſee a ſtar, planet, or any new phenomenon, ſuch as a comet, you may find its declination and right aſcenſion immediately, by turning about the equatorial handle and declination handle, till you ſee the object: and then, looking upon the equatorial plate, you find its right aſcenſion in time; and you find, upon the declination ſemicircle, its declination in degrees and minutes.

In order to have the other uſes of this inſtrument, you muſt make the equatorial plates become parallel to the horizontal plates; and then this teleſcope becomes an *equal altitude* inſtrument, a *tranſit inſtrument*, a *theodolite*, a *quadrant*, an *azimuth inſtrument*, and a *level*. The method of applying it to theſe different purpoſes is obvious. As there is alſo a box with a magnetic needle faſtened in the lower plate of this inſtrument, by it you may adjuſt it nearly in the meridian, and by it you may alſo find the variation of the needle. If you ſet the horizontal meridian and the equatorial meridian in the middle of their nonius indexes, and direct your teleſcope to your meridian mark, you obſerve how many degrees from the meridian of the box the needle points at, and this diſtance or difference is the variation of the needle.

§ 21. *The Binocular Teleſcope.*

The binocular teleſcope conſiſts of two diſtinct teleſcopes ſeverally directed from each eye to the ſame object, and combined together in the following manner. In fig. 1. *a b* and *c d* are two equal teleſcopes laid in a long box, nearly parallel to each other; the intervals between the eye-ſtops *a* and *c* being equal to the interval of the pupils, and that of the centres of the object-glaſſes ſomewhat leſs than the other. Both ends of the teleſcopes paſs through oblong ſlits in both ends of the box; and the interval between them may be widened or contracted at either end by a long ſcrew-pin laid over each end of both the teleſcopes; the threads of each half of the ſcrews being wrought contrary ways, and called a *right* and *left handed ſcrew*. For theſe halves being put through two nuts *e*, *f*, fixed to the upper ſides of the teleſcopes, it comes to paſs, that by turning the ſcrew-pin one way, the two teleſcopes will accede to, and the other way they will recede from, each other; till, by one of theſe ſcrew-pins, the interval between the eye-ſtops *a*, *c*, becomes equal to the intervals of the pupils of the obſerver; and by the other, the axes of the teleſcope become directed to the ſame object; which will be known exactly if there are croſs hairs in the focus of each teleſcope, and even without them. For before this poſition is obtained, the objects will appear double, and afterwards ſingle; and a much ſtronger and brighter appearance of the object will be obtained than by a ſingle teleſcope.—There are other contrivances, beſides that of a two-handed ſcrew, by which the teleſcopes may be made to approach to or recede from each other. To exclude all uſeleſs and hurtful light from the eyes, the eye-ſtops are made hollow and very broad, to cover ſome part of the temples; and their inner parts are cut away, to admit the upper part of the noſe between them. Two reflecting teleſcopes, as well as two refracting ones, might be combined into a binocular teleſcope; and, for the purpoſe of celeſtial diſcoveries, promiſes to be a very uſeful inſtrument.

Plate CCXXIV.

§ 22. *Of making Celeſtial Obſervations.*

In the day-time there is little difficulty in finding the exact time of the tranſit of ſuch ſtars as are capable of being diſcovered by the teleſcope over the middle of the field, becauſe the croſs-hairs placed in the focus of the object-glaſs receive a ſufficient quantity of light to render them viſible. But, in the night-time, theſe hairs are not viſible, and therefore the obſerver hath not any mark to direct him: hence aſtronomers are obliged to enlighten the croſs-hairs artificially, in order to render them viſible, and this without letting the luminous body interfere with the object which they intend to view; and, for doing this, two ways are propoſed.

1. The object-glaſs of the teleſcope may be obliquely enlightened by placing a candle near to it in an oblique ſituation, ſo that its ſmoke or flame may not interfere with the object. But if the object-glaſs ſhould happen to be pretty deep in the tube, it cannot be ſufficiently enlightened by this means; and beſides, if the teleſcope is above ſix feet long, there will be a conſiderable difficulty in throwing a ſufficient quantity of light upon the croſs hairs.

2. By ſome an opening is made in the ſide of the tube near the focus of the object-glaſs, through which the croſs hairs are illuminated by means of a candle. But this method alſo is attended with inconveniencies; for the obſerver is incommoded by the light being ſo near his eyes, and the hairs themſelves become liable to accidents through their expoſed ſituation. An error alſo attends this method; which is, that, according to the poſition of the light illuminating theſe hairs, they will appear in different ſituations. For example, when the horizontal hair is enlightened above, we perceive a luminous line which may be taken for the hair itſelf, and which appears at its upper ſuperficies. On the other hand, when the hair is enlightened underneath, the luminous line will appear at the under ſurface of it; and the error will be the diameter of the hair, which often amounts to more than ſix ſeconds. M. de la Hire, however, found a remedy for this inconvenience. He often obſerved, that in moon-ſhine nights, when the weather was a little foggy, the croſs hairs were diſtinctly ſeen; but when the heavens were ſerene, they could ſcarcely be perceived: he therefore covered with a piece of gauze, or fine ſilk-crape, that end of the tube next the object-glaſs; and this method ſucceeded ſo well, that a link placed at a good diſtance from the teleſcope ſo enlightened the crape, that the craſs-hairs diſtinctly appeared, and the ſight of the ſtars was by no means obſcured.

In making ſolar obſervations, a ſmoked glaſs muſt be uſed for preſerving the eyes; and which may be thus prepared. Take two equal and well poliſhed round pieces of flat glaſs; upon the ſurface of one of which, all round its limb, glue a paſteboard ring: then put the other piece of glaſs into the ſmoke of a lamp, taking it ſeveral times out, and putting it in again, leſt the heat ſhould break it, until the ſmoke be ſo thick, that the lamp can ſcarcely be ſeen through it: but the ſmoke muſt not be all over of the ſame thickneſs, that ſo a place may be choſen anſwering to the ſplendour of the ſun. This being done, the glaſs, thus blackened, muſt be glued to the paſteboard ring abovementioned, with its black ſide next to the other glaſs, that the ſmoke may not be rubbed off.

There are two kinds of obſervations relating to the ſtars: one is, when they are in the meridian; the other, when they are in vertical circles. If the poſition of the meridian be known, the quadrant with which the obſervation is made, muſt be placed in the plane of that circle, and then the meridian altitudes are eaſily obſerved by means of the plumb-line. The meridian altitude of a ſtar may likewiſe be had by a pendulum clock, if the exact time of the ſtar's paſſing by the meridian be known. It muſt be obſerved, however, that ſtars have the ſame altitude a minute before and after their paſſing the meridian, if they be not in or near the zenith; but if they be, their altitudes muſt be taken every minute when they are in or near the meridian, and then their greateſt or leaſt altitudes will be thoſe in queſtion. The poſition of a given vertical circle muſt be found by the following method. 1. The quadrant and teleſcope remaining in the ſame ſituation wherein it was when the altitude of a ſtar, together with the time of its paſſage by the interſection of the croſs hairs in the focus of the object-glaſs, was taken, we obſerve the time when the ſun, or ſome fixed ſtar, whoſe longitude and latitude is known, arrives to the vertical hair in the teleſcope; and from thence the poſition of the ſaid vertical circle will be had, and alſo the obſerved ſtar's true place. But if the ſun, or ſome other ſtar, does not paſs by the mouth of the tube; and if a meridian line be otherwiſe well drawn upon a floor, or very level ground, in the place of obſervation; a plumb-line muſt be ſuſpended from a fixed place, at about 18 or 20 feet from the quadrant; under which a mark muſt be made on the floor, in a right line with the plumb-line. You muſt next put a thin piece of braſs or paſteboard very near the object-glaſs, in the middle of which there is a ſlit vertically placed, and paſſing through the centre of the circular figure of the object-glaſs. Now, by means of this ſlit, the beforementioned plumb-line may be perceived through the teleſcope, which before could not be ſeen, becauſe of its nearneſs. Then the plumb-line muſt be removed and ſuſpended, ſo that it be perceived in a right line with the vertical hair in the focus of the object-glaſs, and a point marked on the floor directly under it. And if a right-line be drawn through this point, and that marked under the plumb-line before it was removed, the ſaid line will meet the meridian drawn upon the floor; and ſo we ſhall have the poſition of the vertical circle in which the obſerved ſtar is, with reſpect to the meridian, the angle whereof may be meaſured in aſſuming known lengths upon the two lines from the point of concourſe; for if, through the extremities of theſe known lengths, a line or baſe be drawn, we ſhall have a triangle, whoſe three ſides being known, the angle at the vertex may be found, which will be the angle made by the vertical circle and meridian.

Under the article Quadrant, is ſhewn the proper method of fixing that inſtrument exactly in the meridian: but where the obſerver has no conveniency of this kind, it will be proper to uſe a portable quadrant; by means of which the altitude of a ſtar muſt be obſerved a little before its paſſage over the meridian, every minute, if poſſible, until its greateſt or leaſt altitude be had; by which means, though we have not the true poſition of the meridian, yet we know the meridian altitude of the ſtar. But although this method is very good, yet if a ſtar paſſes by the meridian near the zenith, we cannot have its meridian altitude by repeated obſervations every minute, unleſs by chance; becauſe in every minute of an hour, the altitude augments 15 minutes of a degree; and in theſe kind of obſervations, the inconvenient ſituation of the obſerver, the variation of the ſtar's azimuth ſeveral degrees in a little time, the alteration that the inſtrument muſt have, and the difficulty in well replacing it vertically again, hinders our making obſervations oftener than once in four minutes, during which time the difference in the ſtar's altitude will be one degree. In theſe caſes, therefore, it will be better to have the true poſition of the meridian, in order to place the inſtrument exactly in it; or to move it ſo that one may obſerve the altitude of the ſtar the moment it paſſes the meridian.

The refraction may be found in the following manner. Having the meridian altitudes, and the declination of two ſtars of nearly equal altitudes, find alſo, by the directions already given, the apparent meridian altitude of ſome ſtar near the pole; and if the complement of that ſtar's declination be added thereto or taken therefrom, we ſhall have the apparent height of the pole. After the ſame manner may the apparent height of the equator be found by means of the meridian altitude of ſome ſtar near it, and adding or ſubtracting its declination. Then theſe heights of the pole and equator being added together, they will always make more than 90 degrees, becauſe both of them are raiſed by the refraction: but taking 90 degrees from this ſum, the remainder will be double the refraction of either of the ſtars obſerved at the ſame height; and therefore taking this refraction from the apparent height of the pole, or equator, we ſhall have their true altitude.

To illuſtrate this: Suppoſe the meridian altitude of a ſtar obſerved below the north pole to be 30° 15′, and complement of its declination 5°; whence the apparent height of the pole will be 35° 15′. Alſo let the apparent meridian altitude of ſome other ſtar, obſerved near the equator, be 30° 40′, and its declination 40° 9′; whence the apparent height of the equator will be 54° 49′. Therefore the ſum of the heights of the pole and equator thus found will be 90° 4′; from which ſubtracting 90°, there remain 4′, which is double the refraction at 30° 28′ of altitude, which is about the middle of the heights found. Therefore at the altitude of 30° 15′, the refraction will be ſomewhat above 2′, viz. 2′ 1″; and at the altitude of 30° 40′, the refraction will be 1′ 59″. Laſtly, if 2′ 1″ be taken from the apparent height of the pole, 35′ 15″, the remainder 35° 12′ 59″ will be the true height of the pole; and ſo the true height of the equator will be 54° 47′ 1″, as being the complement of height of the pole to 90°. The refraction and height of the pole found according to this way, will be ſo much the more exact as the height of the ſtars is greater; for if the difference of the altitudes of the ſtars ſhould be even 2° when their altitudes are above 30°, we may by this method have the refraction and the true height of the pole; becauſe, in this caſe, the difference of refraction in altitudes differing only two degrees is not perceptible.

The quantity of refraction may alſo be found by the obſervation of one ſtar only, whoſe meridian altitude is 90°, or a little leſs: for the height of the pole or equator above the place of obſervation being otherwiſe known, we ſhall have the ſtar's true declination by its meridian altitude; becauſe refractions near the zenith are inſenſible. Now, if we obſerve by a pendulum the exact times when the ſaid ſtar comes to every degree of altitude, as alſo the time of its paſſage by the meridian, which may be known by the equal altitudes of the ſtar being eaſt and weſt, the refraction may be found by the ſolution of a caſe in ſpherical trigonometry: for here, in a ſpherical triangle, we have the diſtance between the pole and zenith, the complement of the ſtar's declination, and the angle comprehended by the arcs abovementioned; namely, the difference of mean time between the paſſage of the ſtar by the meridian and its place, converted into degrees and minutes, to which muſt be added the proper proportional part of the mean motion of the ſun in the proportion of 59′ 8″ per day; therefore the true arc of the vertical circle between the zenith and true place of the ſtar may be had. But the apparent arc of the altitude of the ſtar is had by obſervation, and the difference of theſe arcs will be the quantity of refraction at the height of the ſtar.

To find the time of the equinox and ſolſtice by obſervation, we muſt proceed in the following manner. Having found the height of the equator, the refraction, and the ſun's parallax at the ſame altitude, it will not be difficult afterwards to find the time in which the centre of the ſun is in the equator; for if, from the apparent meridian altitude of the ſun's centre the ſame day that it comes to the equinox, be taken the convenient refraction, and then the parallax be added thereto, the true meridian altitude of the ſun's centre will then be had. Now the difference of this altitude and the height of the equinoctial will ſhew the true time of the true equinox before or after noon: and if the ſum of the ſeconds of that difference be divided by 59, the quotient will ſhew the hours and fractions which muſt be added to or ſubtracted from the true hour of noon to have the time of the true equinox. The hours of the quotient muſt be added to the time of noon, if the meridian altitude of the ſun be leſs than the height of the equator about the time of the vernal equinox; but they muſt be ſubtracted, if it be found greater. We muſt proceed in a contrary manner when the ſun is near the autumnal equinox.

The ſolſtices are found with much more difficulty; for one obſervation only is not ſufficient, becauſe about this time the difference between the meridian altitudes in one day and the next ſucceeding day is almoſt inſenſible. The exact meridian altitude of the ſun muſt therefore be taken for 12 or 15 days before the ſolſtice, and as many after, that ſo one may find the ſame meridian angle by little and little; to the end that, by the proportional parts of the alteration of the ſun's meridian altitude, we may the more exactly find the time when the ſun's altitude is the ſame before and after the ſolſtice, being in the ſame parallel to the equator. Now, having found the time elapſed between both ſituations of the ſun, you muſt take half of it, and ſeek in the tables the true place of the ſun at theſe three times. This being done, the difference of the extreme place of the ſun muſt be added to the mean place, in order to have it with compariſon to the extremes; but if the mean place found by calculation does not agree with the mean place found by compariſon, you muſt take the difference, and add to the mean time, that which anſwers to that difference, if the mean time found by calculation be leſſer; but, if greater, it muſt be ſubtracted, in order to have the time of the ſolſtice.

3 MA 53

Equatorial Teleſcope.

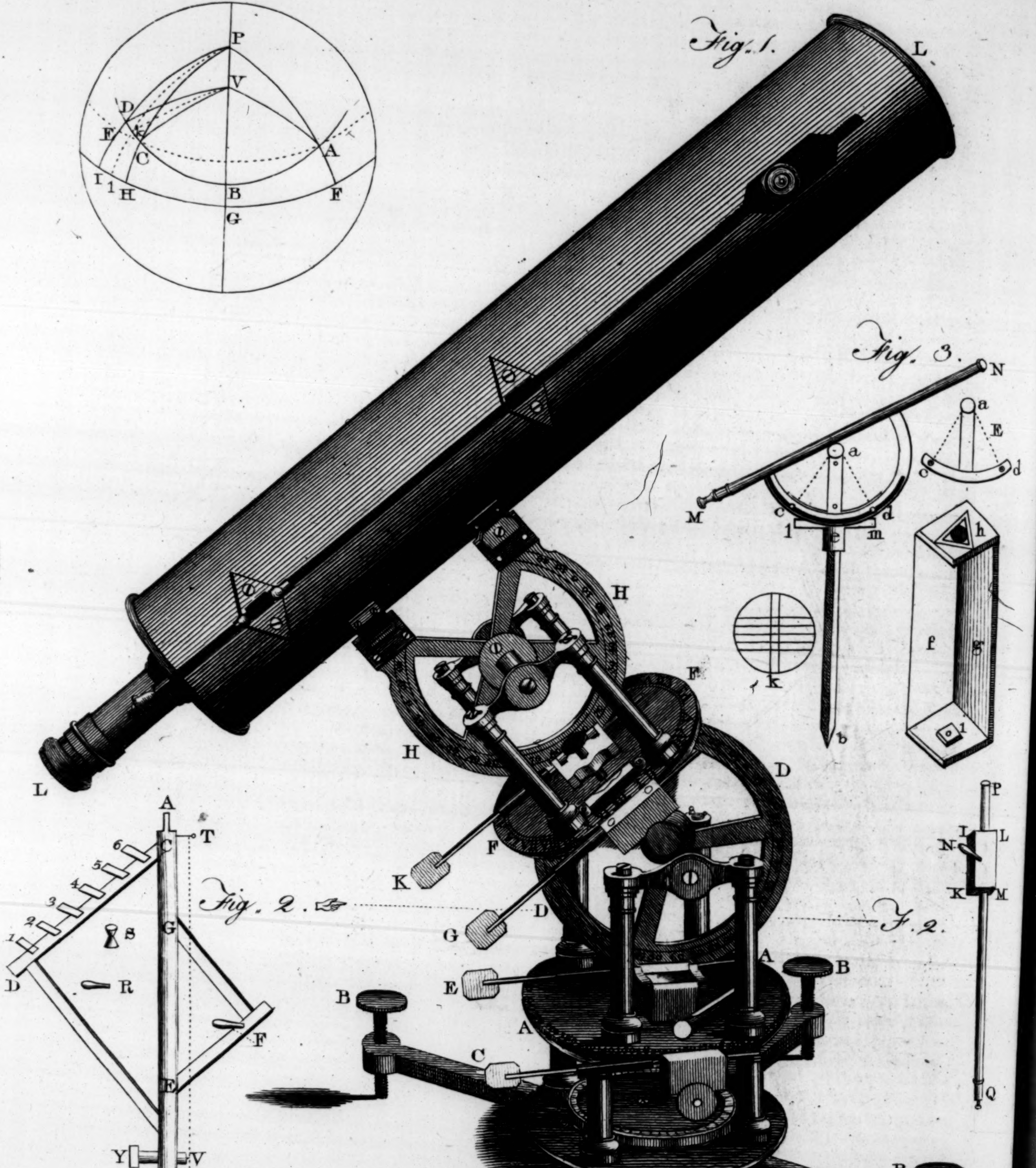


Fig. 4.
P
V
D
E
C
A
I
1
H
B
F
G
Fig. 1.
L
H
F
H
D
L
K
F
G
D
A
B
E
A
C
B
B
B
Fig. 2.
F. 2.
A
T
C
6
5
4
3
2
1
S
G
D
R
F
E
Y
V
B
X
Fig. 3.
N
a
E
c
d
M
a
c
d
1
e
m
h
f
g
k
b
1
P
I
L
N
K
M
Q

A Bell Sculpt.

ſtice. Here it muſt be noticed, that an error of a few ſeconds in the obſerved altitude of the ſun will make an alteration of an hour in the true time of the ſolſtice; whence it is plain, than the true time of the ſolſtice cannot be had but with inſtruments very well divided, and ſeveral very exact obſervations.

With regard to eclipſes, the beginning, end, and total emerſion may be eſtimated with ſufficient exactneſs without teleſcopes; excepting the beginning and ending of lunar eclipſes, where an error of one or two minutes may be made, becauſe it is difficult to determine with certainty the extremity of the ſhadow. But the quantity of the eclipſe, that is, the eclipſed portion of the ſun and moon's diſk, which is meaſured by digits, or the 12th part of the ſun and moon's diameter, and minutes, or the 60th part of digits, cannot be well known without a teleſcope joined to ſome inſtrument. One method of obſerving them by the ſolar teleſcope hath been already deſcribed; but this applies only to eclipſes of the ſun, thoſe of the moon not being diſcoverable by reaſon of the faintneſs of the light: for theſe therefore micrometers muſt be uſed, which are be placed in the focus of the teleſcope, and of which various kinds are deſcribed under the article MICROMETER. The eclipſes of the ſatellites of Jupiter are to be obſerved in the ſame manner, but require a better teleſcope than what is neceſſary for obſerving the eclipſes of our moon.

It is here proper to take notice of the method of obviating a difficulty formerly taken notice of; namely, that in a ſerene night we often find the light of Jupiter and its ſatellites obſerved through the teleſcope to diminiſh by degrees, ſo that it is impoſſible to determine exactly the true times of the immerſion and emerſion of the ſatellites. This proceeds from the dew which falls upon the ſurface of the object-glaſs, and intercepts the light. A very ſure remedy is, to make a tube of blotting paper, about two feet long, and of a ſufficient bigneſs to go about the end of the tube of the teleſcope next to the object-glaſs, which will very effectually drink up the dew, and hinder it from coming to the object-glaſs; and by this means we may make our obſervations with ſufficient exactneſs.

§ 15. *Teleſcopic Inſtruments for finding Time by obſerving when the Sun or any Star has equal Altitudes on each ſide of the Meridian.*

167 Mr Cotes's inſtrument deſcribed.

Plate CCXXVI. fig. 2.

ONE of theſe inſtruments was made by Mr Roger Cotes, and was contrived by him for the purpoſe of regulating a pendulum-clock preſented to the Royal Society by Sir Iſaac Newton, to whom he ſent the following deſcription. "AB is a ſtrong wooden axis about ſix feet in length: CD and DE on one ſide, EF and FG on the other, are pieces framed to each other and to the axis as firmly as was poſſible. Into the piece CD, and at the angle F, were fixed ſtrong wooden pins nearly parallel to each other, and perpendicular to the plane CDEFG. PQ is the cylindrical braſs tube of a five-foot teleſcope (belonging to our ſextant;) this was well faſtened with iron ſtaples and ſcrews to the piece of wood IKML, whoſe under plane ſurface is here repreſented as objected to view. Into this ſurface there was perpendicularly fixed a ſtrong wooden pin N, which was deſigned to hang the upper end of the teleſcope upon any of the pins in CD, whilſt its lower end reſted upon the pin F. Now, that the teleſcope might be taken off, and yet afterwards be again placed accurately in the ſame poſition, I ordered the edges IK and CD, which touched each other, to be rounded like the ſurface of a cylinder, as alſo the edge EF into which the pin F was fixed, and againſt which the cylindrical tube of the teleſcope reſted, ſo that the contact in both places might be made in a point. Upon the ſame account the pins in CD were made a little hollow, as is repreſented at R; and the pin F was a fruſtum of a cone, that thereby the teleſcope might more ſurely touch the edges CD and EF. Into the two ends of the wooden axis were ſtrongly fixed two pieces of well-tempered ſteel: that at the upper end A was a cylinder well turned, which moved in a collar, whoſe cavity, repreſented by S, was figured like two hollow and inverted fruſtums of cones joined together; the lower at B was a cone moving in a conical ſocket of a ſomewhat larger angle. This ſocket had liberty to be moved horizontally, and to be fixed in any poſition by two ſcrews, which preſſed againſt it ſideways at right angles to each other. The inſtrument being thus prepared, I fixed a needle V, at the lower end of the wooden axis, whoſe point ſtood out from it about an inch; then ſuſpending a fine plumb-line TVX from the upper end of the ſome axis, I altered the poſition of the inſtrument by the ſcrews, until the plumb-line came to beat againſt the point of the needle in the whole revolution of the inſtrument, and there I fixed it as prepared for uſe."

So far Mr Cotes. The plumb-line or fine wire TVX was ſuſpended by a loop T upon a braſs pin that ſcrewed into the top of the axis AB; a nick being filed round the pin to ſtay the loop from ſliding out of it. Then by ſcrewing the pin in or out, the plumb-line was brought to the ſame diſtance from the axis AB as the point of the needle is at V: which was fixed in the end of a thick wooden pin Y, not in the axis of it, but towards one ſide; ſo that by turning the pin round itſelf, in a hole bored through the axis AB, the needle's point might deſcribe a ſmall circle, and be brought to touch the plumb-line when parallel to the axis of motion of the wood AB.

168 Earl of Ilay's inſtrument.

Dr Smith gives the following deſcription of an excellent inſtrument of this kind, in the noble collection of the right honourable the earl of Ilay. "It is made all of braſs, except a ſquare ſteel axis *ab* 30 inches in length. To one ſide of the upper part of this axis there is fixed a ſmall ſextantal arch *cd* repreſented ſeparately at E; its centre *a* being at the top of the axis *ab*. The teleſcope MN is alſo 30 inches long, and is fixed along the diameter of a ſemicircle of the ſame radius as the ſextant, and concentric to it. The teleſcope with the ſemicircle being moveable about this centre upon the plane of the fixed ſextant *acd*, may be faſtened to it in any elevation by two nuts and ſcrews *c*, *d*, fixed in the ends of the ſextantal arch; a circular ſlit being made all along the limb of the ſemicircle for theſe ſcrew-pins to ſlide in. Cloſe under theſe arches, the axis *ab* is ſurrounded by a ſhort cylinder *e*, about an inch in diameter, well turned and poliſhed. The lower end of the axis is formed into a fine conical point *b*. The frame in which the axis turns, is a long hollow parallelopiped wanting two ſides. Its other ſides *fg*, are two braſs plates, equal in length to the part *be* of the axis, and are ſcrewed together edgeways. It has for its baſes two equal plates *h*, *i*, four inches ſquare. In the middle of the upper ſquare there is a round hole large enough to receive the cylinder *e*, without touching it; and over this hole is fixed a triangular hole in another plate; one of whoſe ſides is moveable by a ſcrew, to make all the ſides of the triangle touch the cylinder. Upon the lower ſquare there lies a ſmaller plate *i*, with a fine centre-hole to receive the point *b* of the axis. This centre-plate is moveable ſideways by two ſcrews at right angles to each other, which, when the frame is firmly fixed into a nitch of a free-ſtone pillar, will bring the axis *ab* exactly perpendicular to the horizon. This poſition is known by a ſpirit-level *lm* fixed at right angles to the axis above the cylinder, upon the ſide oppoſite to the ſemicircle. Along the top of the level there is a ſliding pointer to be ſet to the end of the air-bubble; and when the poſition of the axis is ſo adjuſted by the ſcrews below, that the air-bubble keeps to the pointer for a whole revolution of the inſtrument, the axis *ab* is certainly perpendicular to the horizon; and then the line of ſight through the teleſcope deſcribes a circle of equal altitudes in the heavens. There are ſeveral of theſe circles deſcribed in the heavens, even when the teleſcope is fixed to the ſextantal arch. For the round hole in its focus has five wires parallel to the horizon at equal intervals from one another, as at *k*; and they are croſſed at right angles in the middle by two other upright wires at a ſmall diſtance from each other. The deſign of ſo many wires is to obſerve when the ſame ſtar is ſucceſſively covered by every one of the five, both in the eaſt and weſt; ſo that the time of its paſſage over the meridian may be had more accurately, by taking a medium among all the obſervations. The diſtances between the five wires need be no greater than to afford time enough to write down the ſeveral obſervations, which muſt be taken when the ſtar is between the perpendicular wires.

169
Uſes of theſe inſtruments.

Time ſhewn by a clock may be called *mechanical*, to diſtinguiſh it from *ſolar* and *ſidereal time*. By obſerving when a ſtar has equal altitudes before and after its culmination or appulſe to the meridian, we have the mechanical time of its culmination. Then by ſubtracting the ſun's right aſcenſion computed to this mechanical time, from the ſtar's right aſcenſion determined for the ſame time, we have the ſolar time of the ſtar's culmination, and conſequently the difference between the mechanical and ſolar times.

Thus, by finding the mechanical times, when the ſame ſtar culminates any two nights, rather at a diſtance from each other than ſucceſſive, we have the difference between a ſidereal day and a mechanical day; and conſequently between a mechanical day and a ſolar day of a mean length.

Hence any number of mechanical minutes may be converted into ſolar or into ſidereal minutes by the rule of three.

Theſe obſervations will anſwer the purpoſe the more exactly as the ſtar is nearer to the prime vertical; becauſe the variation of its altitude is here greater in a given time, than if it were ſituated in any other vertical oblique to the meridian. In the latitude of 50 degrees an error of one minute in altitude, at any point of the prime vertical, will cauſe an error of $6\frac{2}{9}$ ſeconds in time; and in the latitude of 55 degrees it will cauſe an error of near 7 ſeconds; as that excellent geometer Mr Cotes has ſhewn in his treatiſe concerning the *Eſtimation and Limits of Errors* in mixed mathematics, publiſhed at the end of his admirable book called *Harmonia Menſurarum*. It is alſo the ſafeſt to chooſe a ſtar as high as poſſible, leſt a different ſtate of the atmoſphere ſhould cauſe a different refraction of the viſual rays, and conſequently an error in the times of obſervation.

Plate CCXXVII. fig. 4.

The ſolar time may alſo be found by obſerving when the ſun himſelf has equal altitudes in the morning and evening; if we correct the time of the latter obſervation by a juſt allowance for the variation of the ſun's declination, as follows. Upon a celeſtial globe let the pole be at P; the vertex of the obſerver's place at V; the complement of its latitude PV; its meridian PVBG; a circle of equal altitudes ABCD, deſcribed about its pole V; and paſſing thro' the ſun's centre at A at the time of the morning obſervation, and through it at D at the time of the evening obſervation; two circles of declination, PAF, PDI, cutting the equator FGHI, in F and I; a parallel of declination ACE, cutting the circle PDI in E, and ABD in C; three equal vertical arches VA, VC, VD; and laſtly, a third circle of declination PCH cutting the equator in H. Now, had not the ſun varied his declination from A or E to D, in the evening he would have had the ſame altitude at C as in reality he has at D. And then as the angles VPC, VPA, would have been equal, ſo the times of the evening and morning obſervations would alſo have been equidiſtant from noon; being meaſured by thoſe angles, or by the arches GF, GH. Therefore the angle CPD, or the arch IH, which meaſures it, is alſo the meaſure of a portion of time to be ſubtracted from the evening obſervation, if the ſun's declination varies northwards, otherwiſe to be added, to give the time ſought equidiſtant from noon. Let another circle of declination P*kl* biſect the ſmall angle HPI, and conſequently the ſmall arches CD and HI in *k* and *l*. Draw the vertical arch *k*V; and in the triangle *k*PV, we have given PV the complement of the latitude, and P*k* half the ſum of the given complements, PC or PA and PD, of the ſun's declinations at the times of the two obſervations, and laſtly, the included angle *k*PV, by converting half the interval of time between the obſervations into degrees and minutes. Hence by trigonometry we have the angle P*k*V, of an intermediate magnitude between PCV and PDV, and therefore fitter to be uſed inſtead of either of them. Hence alſo we ſhall have the arch IH; by taking it in proportion to DE the difference of the declinations, as the co-tangent of the angle PCV, to the ſine of the arch PC or P*k*. For IH is to DE in a ratio compounded of IH to CE and of CE to DE, that is, of the radius to the ſine of the arch PC, and of the co-tangent of the angle DCE or PCV to the radius: as appears by taking away the common angle DCP from the right angles ECP and DCV; and by conſidering the ſmall triangle DCE, right-angled at E, as if it was rectilinear. The calculation ſuppoſes the ſun's centre has equal altitudes at A and D; which is agreeable to the ob-

OPTICS.

Plate CCXXVII.

Fig. 1.

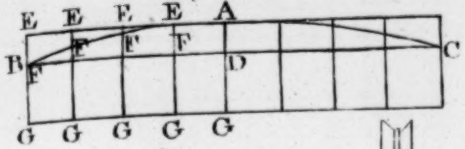

E E E E A
B F F F F D C
G G G G G

Fig. 2.

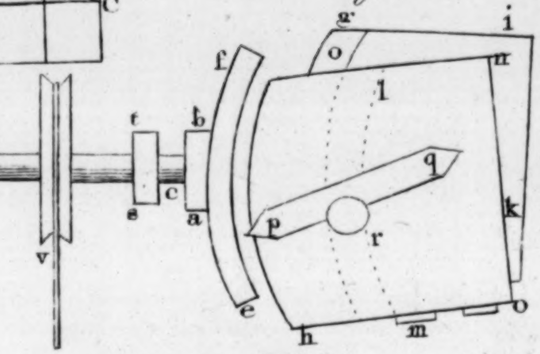

g
o
i
n
f
1
d
t
b
q
c
s
a
p
r
k
v
e
h
m
o

Fig. 3.

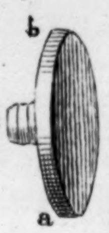


Fig. 4.

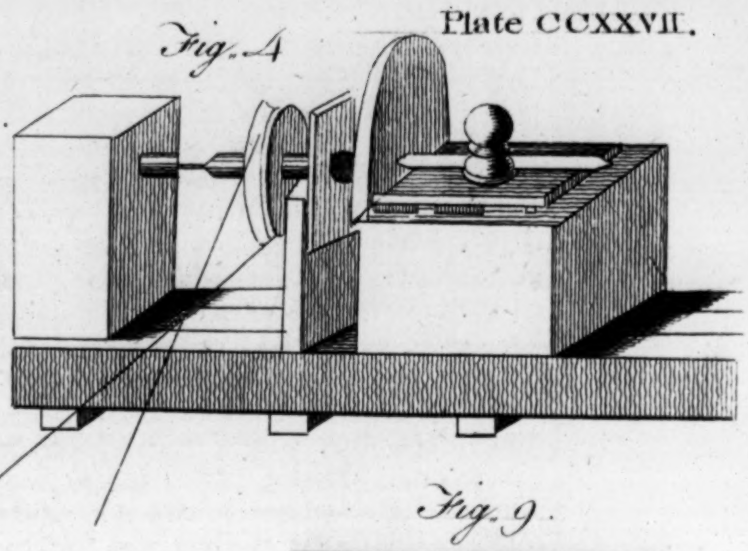


Fig. 5.

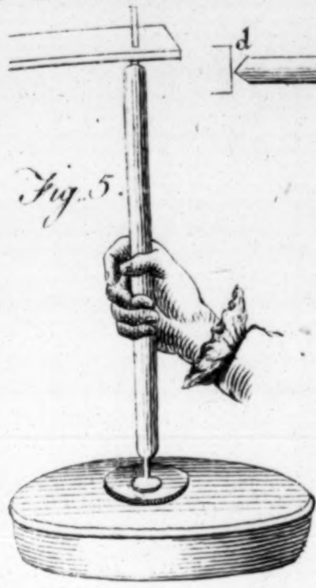


Fig. 6.

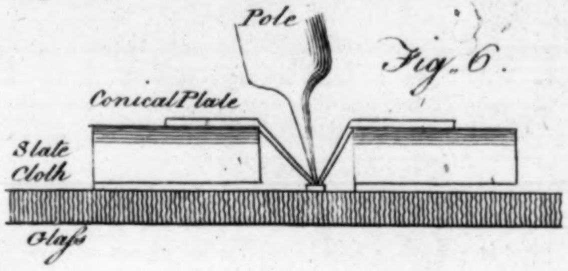

Pole
Conical Plate
Slate
Cloth
Glass

Fig. 8.

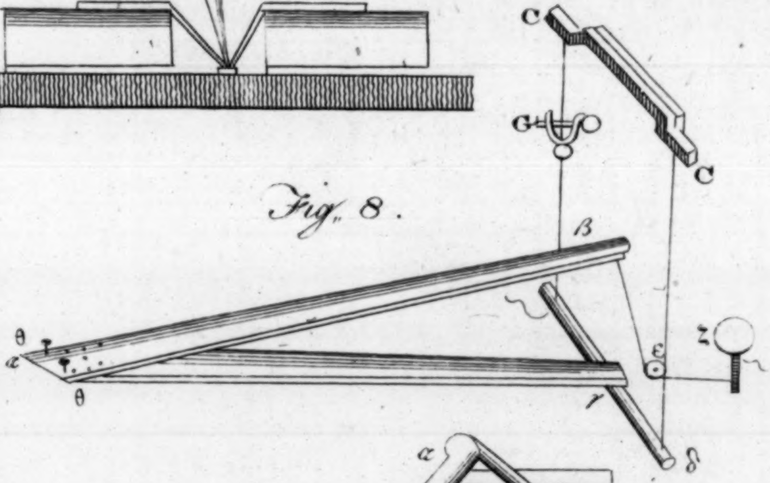

C
G
C
β
θ
α
θ
z
ε
γ
δ

Fig. 9.

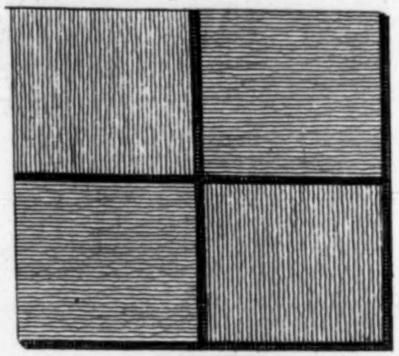


Fig. 7.

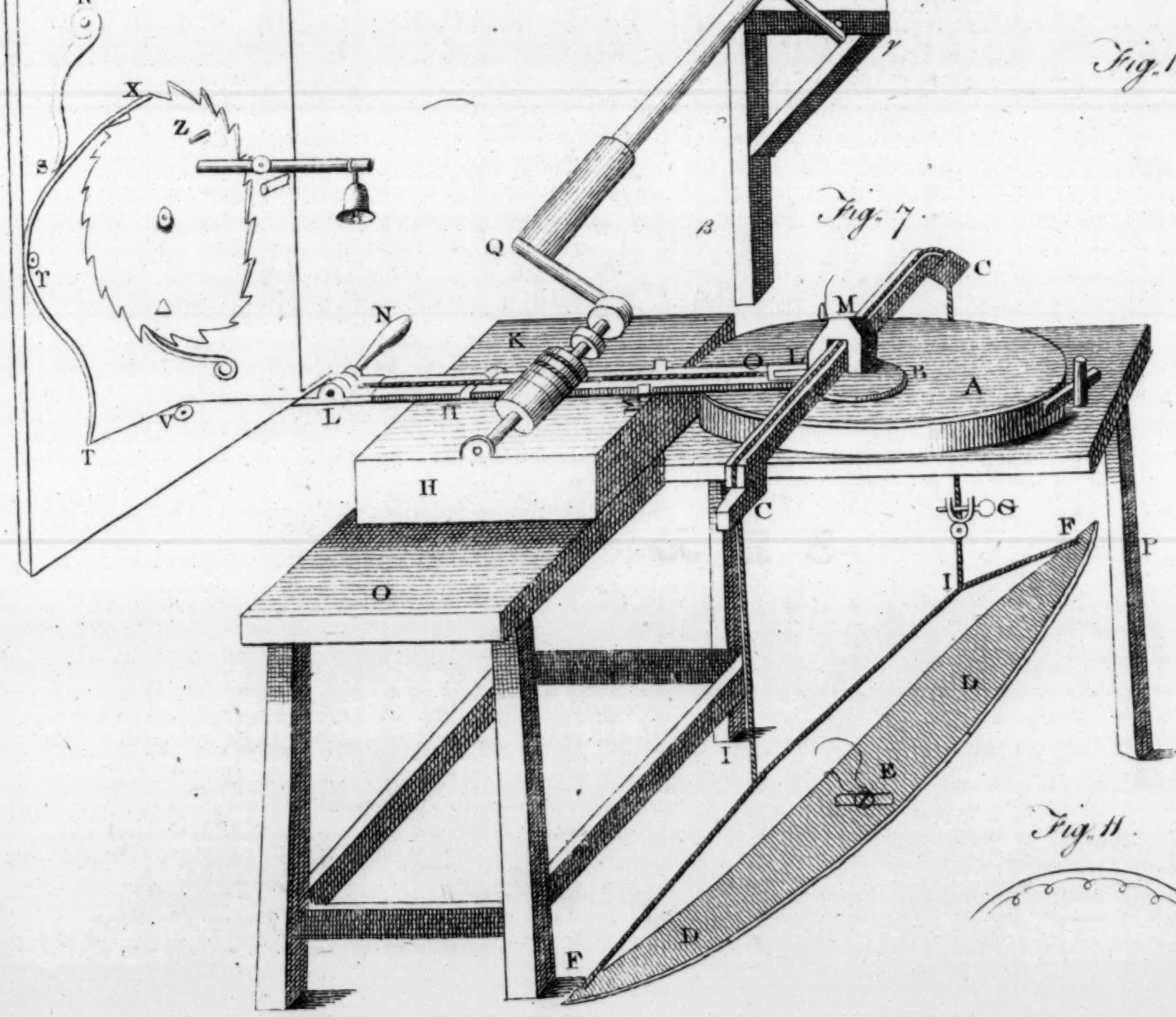

α
γ
R
X
Z
S
β
Q
T
M
C
N
K
O
L
B
A
L
V
n
T
H
C
G
F
P
O
I
D
I
E
F
D

Fig. 10.

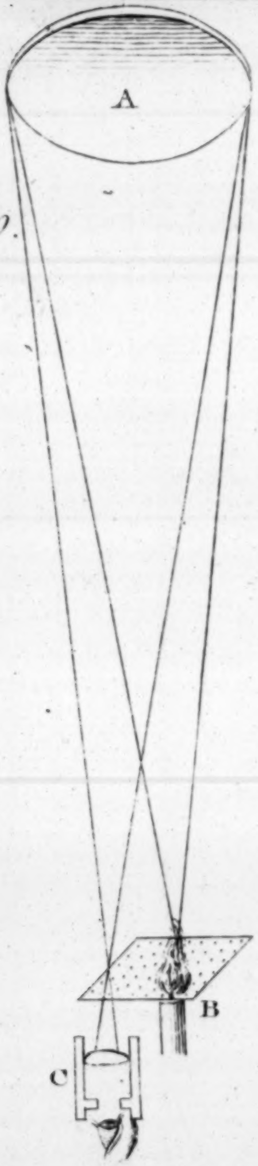


Fig. 11.

A Bell Sculpt.

3 MA 53

obſervations that determine when his upper or his under limb has equal altitudes."

SECT. VI. *Of the Mechaniſm of the principal Optical Inſtruments.*

As part of the mechaniſm of optical inſtruments depends on a knowledge of the arts of caſting, poliſhing and ſoldering braſs and other metals, of turning wood, &c. we muſt neceſſarily confine ourſelves in this ſection to ſome directions concerning the grinding and poliſhing of the glaſſes and ſpecula for microſcopes and teleſcopes, with the method of putting them together and adjuſting them; leaving the fabrication of the other parts to be learned by the ingenuity and induſtry of thoſe who chooſe to employ themſelves in that manner, and for which ſcarce any rules that would be of much ſervice can be laid down.

§ 1. *Of making Glaſs-globules for Microſcopes.*

THOUGH theſe are not found to be of ſuch uſe as ſmall convex lenſes, yet as they are eaſily made, and are ſtill uſed through choice by ſome perſons, we ſhall here give ſome of the beſt methods of making them.

170 Mr Butterfield's method. Mr Butterfield's method of making theſe was by the flame of a ſpirit-lamp, which, inſtead of a wick, had ſeveral folds of fine ſilver-wire doubled up and down like a ſkain of thread. Having prepared ſome fine glaſs, beaten to powder and waſhed very clean, he took a little of it upon the ſharp point of a ſilver needle wetted with ſpittle, and held it in the flame, turning it about till it become quite round, but no longer, for fear of burning it. The art lies in giving the globules an exact roundneſs, which can only be learned by experience. When a great many globules were thus formed, he rubbed them clean with ſoft leather. Then, having ſeveral ſmall pieces of thin braſs plates, twice as long as broad, he doubled them up into the form of a ſquare, and punched a fine hole through the middle of them; and having rubbed off the bur about the holes with a whetſtone, and blacked the inſides of the plates with the ſmoke of a candle, he placed a globule between the two holes, and tacked the plates together with two or three rivets.

171 Mr Hooke's. Dr Hooke, for the ſame purpoſe, uſed to take a very clear piece of glaſs, and draw it out into long threads in a lamp; then he held theſe threads in the flame, till they ran into round globules at the end. He next faſtened the globules with ſealing-wax to the end of a ſtick, ſo that the threads ſtood upwards, and grinding off the ends of the threads upon a whetſtone, poliſhed them upon a ſmooth metal plate with a little putty.

172 Mr Gray's. Mr Stephen Gray tell us, that, for want of a ſpirit-lamp, he laid a ſmall particle of glaſs, about the bigneſs of the intended globule, upon the end of a piece of charcoal, and by the help of a BLOW-*Pipe*, with the flame of a candle, he ſoon melted it into a globule. By this means he made them indifferently clear, and the ſmalleſt very round; but the larger, by reſting upon that ſide, became a little flatted, and received a roughneſs on that ſide. He was therefore wont to grind and poliſh them upon a braſs plate till he reduced them to hemiſpheres; but he found, that the ſmall round globules, beſides that they magnified more, ſhewed objects more diſtinctly than the hemiſpheres.

§ 2. *Of grinding Lenſes for Teleſcopes and Microſcopes.*

A LENS is more eaſily made of an equal convexity on both ſides than of any other figure, becauſe the ſame tools will ſerve for grinding both its ſurfaces. And a glaſs of this figure will make as perfect an image as any other, becauſe the aberrations of the rays occaſioned by the ſpherical figures of the ſurfaces, whatever be the proportion of the ſemidiameters, are inconſiderable in long teleſcopes, in proportion to what is occaſioned by the different refrangibility of the rays, which laſt error Mr Dollond has ſhewn how to correct. If it be propoſed, then, to make a glaſs of equal convexities, that ſhall have a given focal diſtance, the radius of the ſperical ſurface will be found by taking it in proportion to the given focal diſtance as 12 to 11, putting the ſine of incidence to the ſine of refraction out of air into glaſs as 17 to 11, which Sir Iſaac Newton hath accurately determined it to be. The focal diſtance of the glaſs being given, its aperture may be found by the following table.

Length of the teleſcope, or focal diſtance of the object-glaſs.	Linear aperture of the object-glaſs.	Focal diſtance of the eye-glaſs.	Linear amplification, or magnifying power.
Feet.	*Inch&Dec.*	*Inch&Dec.*	
1	0.55	0.61	20
2	0.77	0.85	28
3	0.95	1.05	34
4	1.09	1.20	40
5	1.23	1.35	44
6	1.34	1.47	49
7	1.45	1.60	53
8	1.55	1.71	56
9	1.64	1.80	60
10	1.73	1.90	63
13	1.97	2.17	72
15	2.12	2.32	77
20	2.45	2.70	89
25	2.74	3.01	100
30	3.00	3.30	109
35	3.24	3.56	118
40	3.46	3.81	126
45	3.67	4.04	133
50	3.87	4.26	141
55	4.06	4.47	148
60	4.24	4.66	154
70	4.58	5.04	166
80	4.90	5.39	178
90	5.20	5.72	189
100	5.48	6.03	199
120	6.00	6.60	218
140	6.48	7.13	235
160	6.93	7.62	252
180	7.35	8.09	267
200	7.75	8.53	281

TABLE continued.

Feet.	Inch&Dec.	Inch&Dec.	
220	8.12	8.83	295
240	8.48	8.93	308
260	8.83	9.71	321
280	9.16	10.08	333
300	9.49	10.44	345
400	10.95	12.05	398
500	12.25	13.47	445
600	13.42	14.76	488

Theſe proportions, in Huygens's table for refracting teleſcopes, are meaſured by the Rheinland foot, which is to the Engliſh foot as 139 to 135: ſo that, taking their lengths of as many Engliſh feet, their apertures and eye-glaſſes and linear amplifications ſhould be ſeverally diminiſhed in the ſubduplicate ratio of 139 to 135; that is, nearly in the ratio of 139 to 137, or about $\frac{1}{69}$ or $\frac{1}{70}$th part of the whole.

173 Mr Huygens's directions concerning the ſize of the glaſs and tools for grinding.

Becauſe the figure of the glaſs cannot be made exactly true to its very edges, the breadth of it may be about half an inch more than the diameter of its aperture, or even three quarters, or a whole inch more, if its focal diſtance be between 50 and 200 feet. Mr Huygens directs in general to make the breadth of the concave tool or plate in which an object-glaſs muſt be ground, almoſt three times the breadth of the glaſs; though in another place he ſpeaks of grinding a glaſs whoſe focal diſtance was 200 feet, and breadth 8¼ inches, in a plate only 15 inches broad. But for eye-glaſſes, and others of a ſhorter radius, the tool muſt be in proportion to the breadth of theſe glaſſes, to afford ſufficient room for the hand in poliſhing. Huygens made his tools of copper or caſt braſs; which, for fear they ſhould change their figures by bending, can hardly be caſt too thick: nevertheleſs he found by experience, that a tool 14 inches broad and half an inch thick was ſufficient for grinding glaſſes to a ſphere of 36 feet diameter; when the tool was ſtrongly cemented upon a cylindrical ſtone an inch thick, with hard cement made of pitch and aſhes.

174 Method of making the moulds.

In order to make moulds for caſting ſuch tools as are pretty much concave, he directs that wooden patterns ſhould be turned in a lathe a little thicker and broader than the tools themſelves. But for tools that belong to ſpheres above 20 or 30 feet diameter, he ſays it is ſufficient to uſe flat boards turned circular to the length and breadth required. When the plates are caſt, they muſt be turned in a lathe exactly to the concavity required. And for this purpoſe it is requiſite to make a couple of braſs gauges in the following manner.

175 Of making the gauges.

Take a wooden pole a little longer than the radius of the ſpherical ſurface of the glaſs intended, and through the end of it ſtrike two ſmall ſteel points at a diſtance from each other, equal to the radius of the ſphere intended; and by one of the points hang up the pole againſt a wall, ſo that this upper point may have a circular motion in a hole or ſocket made of braſs or iron firmly fixed in the wall. Then take two equal plates of braſs or copper well hammered and ſmoothed, whoſe length is ſomewhat more than the breadth of the tool of caſt braſs, and whoſe thickneſs may be a tenth or a twelfth part of an inch, and the breadth two or three inches. Then having faſtened theſe plates flat againſt the wall in an horizontal poſition, with the moveable point in the pole ſtrike a true arch upon each of them. Then file away the braſs on one ſide exactly to the arch ſtruck, ſo as to make one of the braſs edges convex and the other concave; and, to make the arches correſpond more exactly, fix one of the plates flat upon a table, and grind the other againſt it with emery. Theſe are the gauges to be made uſe of in turning the braſs tools exactly to the ſphere required.

But if the radius of the ſphere be very large, the gauges muſt be made in the following manner. Suppoſe the line AE, fig. 1. drawn upon the braſs plate, to be the tangent of the required arch AFB, whoſe radius, for example, is 36 feet, and diameter 72. From A ſet off the parts AE, EE, &c. ſeverally equal to an inch, and let them be continued a little beyond half the breadth of the tool required. Then, as 72 feet or 864 inches is to one inch, ſo let one inch be to a fourth number; this will be the number of decimal parts of an inch in the firſt line EF, reckoning from A. Multiply this fourth number ſucceſſively by the numbers 4, 9, 16, 25, &c. the ſquares of 2, 3, 4, 5, &c. and the ſeveral products will be the numbers of decimal parts contained in the 2d, 3d, 4th, and 5th EF reſpectively. But becauſe theſe numbers of parts are too ſmall to be taken from a ſcale by a pair of compaſſes, ſubtract them ſeverally from an inch repreſented by the lines EG; and the remainders being taken from a ſcale of an inch divided into decimal parts, and transferred by the compaſſes from G to F, will determine the points F, F, &c. of the arch required; after which the braſs plate muſt be filed away exactly to the points of this arch, and poliſhed as before.

Plate CCXXVII.

176 Of turning the braſs tool.

To apply the braſs tool to a turning lathe in order to turn the concave ſurface of it exactly ſpherical, let fig. 2. repreſent a view of ſome part of the lathe, taken from a point directly over it; let *a b* repreſent a ſtrong flat diſk of braſs half an inch thick at leaſt, having a ſtrong iron ſcrew-pin firmly fixed in the centre of it, and ſtanding out exactly perpendicular to one ſide; by which it may be ſcrewed into the end *c* of the mandrel or axis of the lathe, repreſented by *c d*. This diſk is repreſented ſeparately in fig. 3. and muſt be well ſoldered to the backſide of the tool *e f*, which therefore, in the middle of it, muſt be made plane, and exactly parallel to the circumference of its oppoſite ſurface, in order that the circumference may be carried round the axis of the lathe in a plane perpendicular to it. The mandrel or axis *c d* turns upon a point *d* in the puppet-head of the lathe, and in an iron collar repreſented by *s t*.

Fig 2, 3, 4.

Let *g h i k* repreſent a board nailed faſt on the other puppet-head; and let the concave gauge *g h* be laid upon this board, with its concave arch parallel to the concavity of the tool *e f*, and be ſcrewed down to the board with flat-headed ſcrews ſunk into the braſs. Let *l m n o* repreſent ſuch another board lying upon the former, with the convex gauge *l m* ſcrewed to the under ſide of it; ſo that, by moving this upper board, the arch of the convex gauge may be brought to touch the concave one, and to ſlide againſt it. The turning tool *p q* is laid upon the moveable board, and is held faſt to it by a broad-headed ſcrew at *r*, to be turned or unturned by the hand upon occaſion. To know whether the concave gauge be exactly parallel to the concavity of the tool *e f* ſcrewed faſt to the mandrel, direct the point *p* of the turning tool *pq* to touch any point of the tool *e f* near its circumference: then having fixed the turning tool *p q* by its ſcrew *r*, turn the braſs tool *e f* half round, and move the upper board till the point *p* of the turning tool be brought overagainſt the ſame mark upon the tool *e f;* and if it juſt touches it as before when the gauges coincide, all is right. If not, the poſition of the head of the lathe may be altered a little by ſtriking it with a mallet. But the beſt way is, to make this examination of the ſituation of the concave gauge, when only one end of it is fixed to the lathe by a ſingle tack or ſcrew, about which it may eaſily be moved into its true poſition. And while the tool or plate *e f* is turning, the ſame examination of its paralleliſm to the gauge muſt be frequently repeated; otherwiſe its ſurface will take a falſe figure. It is convenient that the upper board *l m n o* ſhould project over both the gauges; and to keep its ſurface parallel to that of the under board, two round-headed nails, or a plate of braſs, as thick as the gauges, muſt be fixed to its under ſurface, towards the oppoſite ſide *n o*. Care muſt be taken to drill the holes in the gauges, through which they are ſcrewed to the boards, not too near the poliſhed arches for fear of altering their figure by the yielding of the braſs. The tool and all the parts of the lathe muſt be fixed very firm; becauſe any trembling motion will cauſe the graving tool *p q* to indent the braſs. After the tool is well turned, it muſt be ſeparated from the braſs *a b* by melting the ſolder with live coals laid upon it. In a ſimilar manner may a convex tool be turned by tranſpoſing the gauges.

Mr Huygens adviſes firſt to form the plates or tools in a turning lathe; and then to grind them together with emery; that is to ſay, the concave and convex tool of the ſame ſphere together. But the tools of very large ſpheres, he would have ground at firſt quite plane by a ſtone-cutter; and then ground hollow with a round flat ſtone and emery to the proper gauge. And he preſcribes to uſe for this grinding firſt a ſtone half as broad as the tool, and after that another nearly of the whole breadth of it; and in this way of forming the tools, it will be convenient to tie a little frame of thick paper, or rather of thin paſteboard, about an inch high, round the tool, in order to keep in the emery; and in grinding, the whole muſt be made extremely firm. When the tool is to be poliſhed, it muſt ſtill remain upon the ſtone pedeſtal; otherwiſe it will be in danger of bending a little in the operation.

177
Of poliſhing the tools.

For poliſhing the tools when ground, Mr Huygens directs the concave tool to be daubed with ſoap; after which, he takes the round ſtone above-mentioned, ſomewhat leſs than the tool, (or the convex tool itſelf), and heats it; then he pours upon it ſome hot melted cement (made of pitch and fine powdered and ſifted aſhes, as much as he can mix with it), and then he turns over the ſtone and cement upon the concave tool, into which alſo he had poured a good quantity of the ſame cement; having firſt laid three little pieces of braſs, of equal thickneſſes, on the circumference of it, in order to preſs and keep this cruſt of cement of an exact equal thickneſs in all its parts; and thus he lets them cool together. Then taking the ſtone from the tool, and turning it up, he ſifts upon the cement that ſticks to it a cruſt of very fine emery; and with a flat iron ſpatula, about one third of an inch thick, gently warmed, he preſſes lightly the emery, to ſtick to and incruſtate upon the cement. The whole is then gently warmed, *viz.* the ſtone, cement, and emery, and he again replaces it upon the concave tool, and leaves it again to cool; ſo that he has by this means a cruſt of emery exactly of the figure of his tool; and with this he poliſhes the tool dry, without the addition of any wet, preſſing it hard on the ſurface of the tool. To preſs it the harder, he places upon it a long pole, a little bent, to make it ſpring, whoſe upper end is fixed to the ceiling of the room, or elſe is preſſed downwards by a ſtrong iron ſpring; and he thinks it is neceſſary to have two perſons to rub the ſtone upon the tool. Here, however, it muſt be obſerved, that great care muſt be taken in this, and in all caſes where this way of grinding by a pole is made uſe of, to fix the point of preſſure exactly in the middle.

To bring the concave tool ſtill nearer to perfection, take equal pieces, about an inch ſquare, of blue hone, ſuch as are uſed by engravers for poliſhing their copper, and place as many of them as you can upon the ſurface of the tool to be poliſhed, laying the grain of them, ſome one way, ſome another; ſticking them as cloſe as you can to one another with ſoap and common white ſtarch: then fill up all the interſtices of the hones with clean dry ſand, to about two thirds of the thickneſs of the hones; then having a border of paper or paſteboard put round the tool as before, ſhake the tool gently, that the ſand may equally ſubſide, and blow it every where to an equal depth with a pair of bellows. Then take ſome hard cement, extremely hot, and pour it all over the hones; then having cleaned the ſtone, or convex tool, which before was incruſtated with pitch and emery, place this ſtone (or convex tool) warmed, on the top of the cement, and let all cool together. Then rubbing the tool with this poliſher made with hones, by applying your pole to the top of the ſtone as before, you will know when the tool is brought to perfection, by wiping off the filth, in which caſe all parts of it will appear equally bright by looking upon it obliquely againſt the light. If you would uſe this poliſher again, it muſt be kept in a cool cellar, leaving the hones uppermoſt; otherwiſe in warm weather they will change their ſituation in the cement, even by their own weight.

178
Cement for faſtening on the glaſſes.

The cement uſed for faſtening the glaſſes is made of ſeveral different compoſitions, according to the fancy of the operator. Cherubin informs us, that it was uſually made of common black pitch and fine ſifted vine-aſhes: but he himſelf made it of roſin and ochre, or roſin and Spaniſh white; pounding the roſin firſt, and mixing it with a due quantity of the powder, and then ſifting the mixture upon hot melted pitch, and, while hot, well mixing and incorporating the whole. By others, the cement is made of pitch and common coal-aſhes ſifted fine. In all caſes, it is harder or ſofter, as more or leſs of the aſhes or other fine powder is put into it: and in the preſent caſe, for poliſhing theſe tools, it muſt be made as hard as poſſible, by putting in a large quantity of aſhes; for otherwiſe, if the cement

ment is not hard enough, the particles of the emery will be looſened by the heat in grinding, and then will only run round upon the tool, without working out the little inequalities thereof. If the emery ſhould be found to grow blunt, a very little more of it may be duſted dry upon the tool, by which its ſharpneſs and cutting quality will be a little recovered; but if the cement be ſufficiently hard at firſt, the emery will always remain ſufficiently ſharp.

179
Of chooſing the glaſs.

The beſt kind of glaſs is perfectly white; but great care muſt be taken in chooſing it totally free from veins. To diſcover theſe veins, one ſhould look very obliquely againſt a ſmall light in a room otherwiſe dark. In this manner one may examine pieces of a poliſhed looking-glaſs, of which object-glaſſes are ſometimes made; but becauſe theſe are ſeldom of a ſufficient thickneſs for this purpoſe, it will be proper to take ſome pieces of the ſame ſort of glaſs before it is poliſhed, and get it ground to an equal thickneſs and poliſhed a little by the common glaſs-grinders, in order to judge what pieces are fit for uſe. Sometimes little veins will appear like fine threads, which ſcarce do any harm. Sometimes their imperfections cannot be diſcovered by the former way of trial; and yet after the glaſs is well formed and poliſhed, they will appear by reflection in the following manner. In a dark room place the glaſs upright upon a table, turning that ſurface from you which is ſuſpected to be faulty; then holding a lighted candle in your hand, ſo that the middle of the broad light reflected from the firſt ſurface may fall upon your eye, recede from the glaſs till the rays reflected from the back ſurface ſhall juſt begin to invert the candle; then the whole glaſs will appear all over bright, and then you will diſcover its defects, and the imperfections of the poliſh. When the glaſs is a portion of a large ſphere, we uſe a ſmall perſpective, three or four inches long, to magnify the defects.

180
How glaſſes are to be ſmoothed and rounded.

The pieces of glaſs above-mentioned ſhould be much broader than the intended object-glaſs, that there may be room enough for chooſing the beſt part of them. For planing and ſmoothing theſe large pieces of glaſs, plates of caſt-iron may be made uſe of; ſuch as are ſold at the iron-mongers ſhops, after they have been ground and planed on a ſtone-cutter's engine. Upon the plate of glaſs, with a diamond-pointed compaſs, ſtrike a circle repreſenting the object-glaſs; and alſo another concentric circle, with a radius about a tenth or twelfth part of an inch bigger: And alſo two other ſuch circles, on the other ſide of the glaſs, directly oppoſite to the former; which may be done by means of the circular glaſs to be afterwards deſcribed. The larger parts of the glaſs may be ſeparated from the outward circle by a red-hot iron, or by a ſtrong broad vice, opened exactly to the thickneſs of the glaſs. The remaining inequalities may be taken off by a grind-ſtone; beginning with the largeſt firſt, and taking care that they do not ſplinter. Then, having warmed the glaſs, cement a wooden handle to it; and in a common deep tool for eye-glaſſes, making uſe of white clear ſand and water, grind the circumference of the glaſs exactly true to the innermoſt circle on each ſide of it. Then, having made a great many ſmall cavities with a punch upon one ſide of a round copper-plate, and having fixed the other ſide of it upon the middle of the round glaſs, by cement made with two parts of roſin or hard pitch, and one part of wax, place the ſteel-point of the ſpringing pole above deſcribed, being 14 or 15 feet long, into that cavity of the copper plate which lies neareſt the thickeſt part of the glaſs; then work the glaſs by the pole with ſand and water upon a flat plate of caſt iron, of a round figure, the plate having been planed with ſand and water by a ſtone-cutter. Then having examined the thickneſs of the glaſs in ſeveral places by a hand-vice, which is better than a pair of callipers, by repeating the ſame operation, it will ſoon be reduced to an equal thickneſs in all its parts. Towards the end of this operation it will be convenient to make uſe of ſifted emery, becauſe the ſand will ſcratch too deep: and then it will alſo be neceſſary to place the ſteel-point of the pole exactly over the centre of the under ſurface of the glaſs; otherwiſe that ſurface will take a cylindrical or convex figure, even though it was exactly plane before you began to grind it; and when concave glaſſes are to be poliſhed, it is alſo abſolutely neceſſary to place the point of preſſure exactly over the centre of the under ſurface of the glaſs. To bring one of the little cavities in the copper-plate exactly over that centre, a circular glaſs is made uſe of, formed from a broken looking-glaſs with the quickſilver rubbed off. On this muſt be deſcribed, with a diamond-pointed compaſs, eight or ten concentric circles, about a quarter of an inch diſtant from each other, ſo that the larger circles may be ſomewhat bigger than the circumference of the glaſs to be poliſhed. Lay this circular glaſs upon the ſurface of the glaſs to be poliſhed; and move it to and fro till you perceive that the circumference of the glaſs to be poliſhed is exactly parallel to the neareſt circle upon the circular glaſs; then, having inverted both the glaſſes, lay the circular glaſs upon a table, and having laid a ſmall live coal upon the copper plate, to make it moveable on the cement, place one point of a pair of compaſſes in one of the little cavities, and move the copper till a circumference deſcribed with the other point coincides exactly with any one circle upon the circular glaſs, and the buſineſs is done. It is convenient to paſte three ſlender ſhreds of fine linen directed towards the centre of the circular glaſs, that the other glaſs may not ſlide too eaſily upon it, and that they may not ſcratch one another. The cavities punched in the copper plate, and alſo in the point of the pole, ſhould be triangular, to hinder the rotation of the glaſs; which is ſtill more neceſſary in giving it the laſt poliſh. Here alſo we muſt obſerve whether the circumference remains exactly circular on both ſides of it, which muſt be tried with compaſſes: and if it be not, it muſt be corrected again by grinding it exactly circular in a common tool for making eye glaſſes; which will contribute very much to its taking an exact ſpherical ſurface when it comes to be ground in its proper tool. For if any part of the circumference be protuberant, it will hinder the adjoining parts of the ſurface from wearing ſo much as they ſhould do; and of conſequence will ſpoil its ſurface.

When the glaſs is thoroughly planed and rounded as above, take away the plate with the ſeveral cavities, and, with ſome of the ſame cement, fix on a ſmaller round piece of braſs or rather ſteel truely flat, and turned about the bigneſs of a farthing, but thicker, having firſt made in the centre thereof, with a triangular ſteel punch, a hole about the bigneſs of a gooſe-quill, and about the depth of $\frac{1}{12}$ of an inch ; and at the very bottom of this triangular hole, a ſmall round hole muſt be punched, ſomewhat deeper, with a very fine ſteel punch. A ſmall ſteel point about an inch long muſt be truly ſhaped and fitted to this triangular hole, and, at the very apex, to the ſmall, round, deeper impreſſion. Nevertheleſs, it muſt not be fitted ſo exactly, but that it may have ſome liberty to move to and fro ; the apex always continuing to preſs upon the ſurface of the round hole below. This ſteel triangular point muſt be fixed to one end of a pole ; to the other end of which another round iron point muſt be fixed, of about five or ſix inches long, to play freely up and down in a round hole in a piece of braſs let into a board fixed in the cieling for that purpoſe, perpendicularly over the bench, and over the centre of the tool, which muſt be ſtrongly and truely fixed horizontally thereon. Mr Huygens directs the braſs plate to be fixed to the glaſs by means of cement, and takes no notice of any other method whatever ; though it is plain, that it is hardly poſſible, in this, or any other caſe, to bring the cement to a fluidity ſufficient to fix two plane ſurfaces exactly parallel to one another, without heating the glaſs, and the braſs alſo, to a very great degree, and thus endangering the glaſs conſiderably. To avoid this, ſome have uſed plaſter of Paris ; others cement an intermediate glaſs to the braſs or wood, and then fix the glaſs to be ground to the outward ſurface of the cemented glaſs with common glue. It may eaſily be done, however, with common iſinglaſs or fiſh-glue, which will run very fluid, and will fix the glaſs and the braſs of itſelf ſtrongly together. Some common ſoft red wax is to be ſtuck on the edges of the braſs, to keep wet from getting to the glue.

Plate CCXXVII. fig. 5.

For grinding glaſſes truely plane by this method, Mr Huygens preſcribes the pole to be about 15 feet long ; but, in grinding upon a concave plate, the pole is moſt conveniently made of the ſame length with the radius of the ſphere, though Dr Smith is of opinion that it would not be material if made conſiderably ſhorter, as the height of the room may allow. It is neceſſary to have, lying by, an ordinary piece of coarſe glaſs ground in the ſame tool, called a *bruiſer ;* whereby, when any new emery is laid on the tool in grinding the glaſs, it muſt be firſt run over and ſmoothed, for fear that any little coarſe grains ſhould remain and ſcratch the glaſs.

Things being thus prepared, ſome pots of emery of various fineneſſes muſt be prepared. Take of the rougheſt ſort a ſmall half-pugil, wetting and daubing it pretty equably on the tool : then lay on your glaſs, and fix up the pole, continuing to grind for a quarter of an hour ; not preſſing upon the pole, but barely carrying the glaſs round thereby : then take the like quantity of ſome fine emery, and work another quarter of an hour therewith ; and then take the like quantity of emery ſtill finer, and work for the ſame time : after which you muſt work for an hour and an half with ſome of the fineſt emery you have, taking away by little and little ſome of the emery with a wet ſponge. It muſt neither be kept too moiſt nor too dry, but about the conſiſtence of pap. Much depends on this laſt circumſtance. For, if it is too dry, the emery will clog and ſtick, and incorporate in ſuch a manner as to cut little or none at all, unleſs here and there, where its body chances to be broke ; and in thoſe places it will ſcratch and cut the glaſs irregularly : or if it is too much diluted, it will, from the irregular ſeparation of its parts, cut in ſome places more than in others, as in the former caſe.

But Mr Huygens tells us, that this method of uſing various ſorts of freſh emery is not good ; as in this way, he finds by experience, that the beſt glaſſes are often ſcratched. For this reaſon, he adviſes to take a large quantity of emery of the firſt or ſecond ſort, and work with it from firſt to laſt, taking away by little and little every half hour, or quarter of an hour, more and more of the emery with a wet ſponge. By this means he could bring the glaſs extremely ſmooth and fine, ſo that a candle or ſaſh window could be ſeen through it pretty well defined ; which is a mark of its being ſufficiently well ground for receiving the laſt poliſh. But, if the glaſs has not acquired this degree of tranſparency, it is certain, ſays Mr Huygens, that too much emery remains ; and therefore it muſt ſtill be diminiſhed, and the operation continued. He found common well-water moſt proper in this operation of grinding ; and he took care to move the glaſs in circles, taking an inch beyond the centre of the tool, and ſomewhat beyond its outſide ; and he found in a glaſs of 200 feet, whoſe diameter was 8¼ inches, which he ground in a tool of 15 inches diameter, that the figure of the tool in grinding would alter conſiderably, unleſs he carried the glaſs round an inch beyond the centre of the tool one way, and 3½ inches beyond the ſkirts of it another way ; but if he carried it no farther than a ſtraw's breadth beyond the ſkirts of the tool, and of conſequence farther beyond the centre, the glaſs would always grind falſely, ſo that he could never afterwards bring the outſides of it to a true and fine poliſh.

When you firſt begin to grind, and the emery begins to be ſmooth, the glaſs will ſtick a little to the tool and run ſtiff. Then freſh emery is to be added. When it afterwards comes to be poliſhed, it will, if large, require a conſiderable ſtrength to move it ; but this inconvenience will happen leſs in grinding by the pole than in grinding with the hand. For the warmth of the hand makes the ſubſtance of the glaſs ſwell ; and not only increaſes the ſticking of the glaſs, but in ſome meaſure may ſpoil the figure of it, as alſo of the tool. When it is ground with the pole, it never ſticks very ſtrongly, unleſs when you take the glaſs off from the tool, and keep it from it for ſome time, and then apply it to the tool again : and this in large glaſſes ; for by this means the glaſs gets from the air a greater warmth than it had on the tool ; and being again applied to the tool, its lower ſurface is ſuddenly contracted by the cold, and thus ſticks to the tool. Wherefore, ſays Mr Huygens, you muſt in that caſe wait till the glaſs and the tool come to be of one temperature. The like effect is obſervable in grinding when there is a fire in the room ; and hence we may ſee the great nicety requiſite in grinding theſe large glaſſes, and the neceſſity of attending even to the minuteſt circumſtances.

Inſtead of emery, Father Cherubin preſcribes the grit of a hard grind-ſtone, well beaten into fine powder, and ſifted. The ſame thing hath been done by common white-ſand waſhed clean, taking away by little and little the grit as it became finer and finer. Nay, glaſſes have been frequently poliſhed off in this manner without the uſe of any other material whatever. This method is called *drying off on ſand;* becauſe, as the matter grows finer and finer, they wet it leſs and leſs, till for the laſt quarter of an hour (the whole work laſting nearly two hours) they only wet it by breathing upon it; and at the very laſt, not at all. This method, however, is now entirely diſuſed; for which Dr Smith aſſigns, as one reaſon, the violent labour requiſite at the laſt: another and better reaſon, he ſays, may be, the great improbability of grinding or poliſhing true by this method, by reaſon of the uncertain and unequal force of the hand. But if this laſt is the reaſon, Dr Smith is of opinion, that the method might be reſtored, and greatly improved by adding a pole, and ſpring to preſs down the pole, or ſome analogous contrivance. And in all methods of grinding hitherto invented, the artiſt muſt allow time to bring his glaſs by grinding to the ſmootheſt and fineſt ſurface that he poſſibly can, before he attempts to give the laſt poliſh. For the ſmoother you bring it in grinding, the leſs labour you will have in poliſhing; in which conſiſts not only the greateſt difficulty, but the greateſt danger of ſpoiling all you have already done.

Plate CCXXVII. fig. 6.

In order to give the laſt and fineſt poliſh to glaſſes, Mr Huygens directs us to proceed as follows. "Having removed the little braſs plate from the glaſs, take a very thick ſlate, or rather a block of blue or grey ſtone; let it be half an inch thick, and let it be ground true and round at the ſtone-cutter's; its diameter being ſomewhat ſmaller than the diameter of your glaſs, leaving a hole quite through in the centre, of about an inch diameter. Then make ſome cement of two parts roſin or hard pitch, and one part wax; and taking a piece of thick kerſey cloth, truly and equally wrought, cut this cloth round, and leave a like hole one inch diameter in the middle. Then warming the ſtone and alſo warming the glaſs, and ſpreading thinly and equably upon them ſome of this cement, lay on the cloth, and thereupon lay alſo the glaſs, having left in the middle a ſpace the breadth of a ſhilling uncemented and blacked with a candle. Then provide an hollow conical plate of iron or ſteel (ſhaped like an high-crowned hat) having the baſis of the cone 1 inch diameter, and having round the baſis a flat border about $2\frac{1}{2}$ inches diameter, and having the depth or altitude of the cone exactly of the thickneſs of the ſlate, cloth, and cement, to which the glaſs is fixed. The vertex of this cone muſt go down thro' the ſlate and cloth; ſo that being cemented on the ſlate, the ſaid vertex may approach to the glaſs within a hair's breadth, and lie perpendicularly over the centre of the lower ſurface of the glaſs: and this muſt be adjuſted by the circular glaſs deſcribed above. Within the vertex of this hollow cone, the lower point of the pole is to be applied in poliſhing; but it may be firſt proper to be obſerved, that fiſh-glue and a braſs plate, in lieu and of the dimenſions of the aforeſaid ſlate, may perhaps be better. Mr Huygens obſerves alſo, that the angle of the cone ſhould be 80 or 90 degrees, and that the hollow vertex of it ſhould be ſolid enough to receive a ſmall impreſſion from a round ſteel punch, to put the point of the pole into, which might otherwiſe have too much liberty, and ſlip from the vertex. The deſign of the black ſpot in the middle of the glaſs, is to diſcover by the light of a candle obliquely reflected from your glaſs, after it has been poliſhed ſome time, whether it be perfectly clear, and free from the appearance of any bluiſh colour like that of aſhes.

Before the work of poliſhing is begun, it is proper to ſtretch an even well wrought piece of linen over the tool, duſting thereupon ſome very fine tripoly. Then taking the glaſs in your hand, run it round 40 or 50 times thereupon; and this will chiefly take off the roughneſs of the glaſs about the border of it, which otherwiſe might too much wear away the lower parts of the tool, in which the glaſs is chiefly to obtain its laſt poliſh. This cloth is then to be removed, and the glaſs is to be begun to be poliſhed upon the very naked tool itſelf. But firſt there is to be prepared ſome very fine tripoly, and alſo ſome blue vitriol, otherwiſe called *cyprion*, Engliſh and Hungarian vitriol finely powdered: mix four parts of tripoly with one of vitriol: 6 or 8 grains of this mixture (which is about the quantity of two large peas) is ſufficient for a glaſs 5 inches broad. This compound powder muſt be wetted with about 8 or 10 drops of clear vinegar in the middle of the tool; and it muſt be mixed and ſoftened throughly with a very fine ſmall mullet. Then with a coarſe painting bruſh, take great care to ſpread it thinly and equably upon the tool, or at leaſt upon a much larger ſpace in the middle of it than the glaſs ſhall run over in the poliſhing. This coat muſt be laid on very thin, (but not too thin neither), otherwiſe it will waſte away too much in the poliſhing, and the tool will be apt to be furrowed thereby, and to have its figure impaired; inſomuch that ſometimes a new daubing thereof muſt be laid on, which it is not eaſy to do ſo equably as at firſt. This daubing muſt be perfectly dried by holding over it a hot clean frying-pan, or a thin pan of iron, with light charcoal therein for that purpoſe; then leave all till the tool is perfectly cold. Then having ſome other very fine tripoly very well waſhed and ground with a mullet, and afterwards dried and finely powdered, take ſome of the ſame and ſtrow it thinly and equably on the tool ſo prepared; then take your coarſe glaſs which lay by you, and ſmooth all the ſaid tripoly very equably and finely: then take your glaſs to be poliſhed, and wipe it thoroughly clean from all cement, greaſe, or other filth which may ſtick to it, with a clean cloth dipped in water, a little tinged with tripoly and vitriol; then taking your glaſs in your hand, apply it on the tool, and move it gently twice or thrice, in a ſtraight line, backwards and forwards; then take it off, and obſerve whether the marks of the tripoly, ſticking to the glaſs, ſeem to be equably ſpread over the whole ſurface thereof; if not, it is a ſign that either the tool or the glaſs is too warm; then you muſt wait a little and try again till you find the glaſs takes the tripoly every where alike. Then you may begin boldly to poliſh, and there will be no great danger of ſpoiling the figure of the glaſs; which in the other caſe would infallibly happen. If the tool be warmer than the glaſs, it will touch the glaſs harder er in the middle than towards its circumference; becauſe the upper ſurface of the tool being ſwelled by heat will become too flat. On the contrary, if the glaſs be warmer than the tool, it will bear harder towards its circumference than at the centre; becauſe the inferior ſurface of the glaſs is contracted by the coldneſs of the plate, more than the ſuperior.

Mr Huygens ſays, that if the work of poliſhing were to be performed by ſtrength of hand only, it would be a work of very great labour, and even could not be performed in glaſſes of 5 or 6 feet focal diſtance: and he ſeems to think it abſolutely neceſſary that an extraordinary great force or preſſure ſhould be applied upon the glaſs. For this purpoſe he has therefore contrived and deſcribed two methods for ſufficiently increaſing the preſſure †; both of which chiefly conſiſt in applying the force of a ſtrong ſpring to preſs down the centre of the glaſs upon the poliſher.

† See n°185.

181 Sir Iſaac Newton's method of poliſhing.

This operation of poliſhing, as it is one of the moſt difficult and nice points of the whole, hath been very variouſly attempted and deſcribed by various authors. Sir Iſaac Newton, Pere Cherubin, Mr Huygens, and the common glaſs-grinders, have taken different methods in this matter. Sir Iſaac is the only perſon who ſeems not to inſiſt on the neceſſity of a very violent and ſtrong preſſure. In the Engliſh 8vo edition of his Optics, p. 95. he hath theſe words: "An object-glaſs of a 14 foot teleſcope, made by an artificer at London, I once mended conſiderably, by grinding it on pitch with putty, and leaning very eaſily on it in the grinding, leſt the putty ſhould ſcratch it. Whether this may not do well enough for poliſhing theſe reflecting glaſſes, I have not yet tried. But he that ſhall try either this or any other way of poliſhing which he may think better, may do well to make his glaſſes ready for poliſhing by grinding them without that violence wherewith our London workmen preſs their glaſſes in grinding: for by ſuch violent preſſure, glaſſes are apt to bend a little in the grinding, and ſuch bending will certainly ſpoil their figure."

As to his own method of poliſhing glaſs, he no where expreſsly deſcribes it; but his method of poliſhing reflecting metals he doth; and it was thus, in his own words, p. 92. "The poliſh I uſed was in this manner. I had two round copper plates each ſix inches in diameter, the one convex the other concave, ground very true to one another. On the convex I ground the object-metal or concave, which was to be poliſhed, till it had taken the figure of the convex and was ready for a poliſh. Then I pitched over the convex very thinly, by dropping melted pitch upon it, and warming it to keep the pitch ſoft, whilſt I ground it with the concave copper wetted to make it ſpread evenly all over the convex. Thus by working it well, I made it as thin as a groat; and after the convex was cold I ground it again, to give it as true a figure as I could. Then I took putty, which I had made very fine by waſhing it from all its groſſer particles; and laying a little of this upon the pitch, I ground it upon the pitch with the concave copper till it had done making a noiſe; and then upon the pitch I ground the object-metal with a briſk motion for about two or three minutes of time, leaning hard upon it. Then I put freſh putty upon the pitch, and ground it again till it had done making a noiſe, and afterwards ground the object-metal upon it as before. And this work I repeated till the metal was poliſhed, grinding it the laſt time with all my ſtrength for a good while together, and frequently breathing upon the pitch to keep it moiſt, without laying on any more freſh putty. The object-metal was 2 inches broad, and about $\frac{1}{3}$ of an inch thick to keep it from bending. I had two of theſe metals, and when I had poliſhed them both, I tried which was beſt, and ground the other again to ſee if I could make it better than that which I kept. And thus by many trials I learned the way of poliſhing, till I made thoſe two reflecting perſpectives I ſpoke of above. For this art of poliſhing will be better learned by repeated practice than by my deſcription. Before I ground the object-metal on the pitch, I always ground the putty on it with the concave copper, till it had done making a noiſe; becauſe, if the particles of the putty were not by this means made to ſtick faſt in the pitch, they would, by rolling up and down, grate and fret the object-metal, and fill it full of little holes. It ſeems not improbable, that glaſs may alſo be poliſhed, with proper care, by the ſame method."

182 Pere Cherubin's method.

Pere Cherubin poliſhes with tripoly or putty; or firſt with tripoly, and afterwards with putty. But what he ſeems moſt to approve of is putty alone. He poliſhes in the ſame tool he grinds in, and deſcribes various ways of doing it. He preſcribes to ſtretch very tight a fine thin leather, fine Engliſh fuſtian, or fine Holland, or any fine linen, or fine ſilk taffety or ſatin, all of an equable thickneſs, as near as may be, upon the tool; then he daubs thinly on this ſurface, thus ſtretched, a ſtreak of putty wetted to the conſiſtence of thick ſyrup, about as broad as the glaſs, or a little more, paſſing through the centre of the tool directly from him; then ſmoothing the putty by running his bruiſer, and preſſing it backwards and forwards to him and from him, he at length lays on the glaſs cemented to its handle, and giving it always the ſame motion, ſtrongly preſſing to him and from him along the ſtreak of putty, and by ſuch preſſure forcing the ſurface of the ſilk, already ſomewhat ſtretched, cloſe to the ſurface of the tool, to which the figure of the glaſs was exactly adapted, he ſays that he could by that means obtain an excellent fine poliſh on any of the abovementioned ſubſtances. Before every ſtroke, he turned the glaſs a little on its axis; and its handle was on this occaſion conſiderably heavier than uſual in grinding, which he commends as very uſeful in this buſineſs; and if new putty was wanting, he made no difficulty in laying it on as often as neceſſary, always carefully ſmoothing it thereon with the bruiſer before the glaſs was applied.

183 Dr Smith's improvements.

This method, according to Dr Smith, might be improved by moving the glaſs, not by hand, but by the pole and ſpring, ſomewhat after the manner of Huygens; eſpecially if the pole were contrived not to move looſe in a round braſs hole above, but on a ſtrong point preſſed down by ſome ſpring; the length of the pole being equal to the radius of the tool, and the point where the ſpring preſſes the upper end of the pole, being truly perpendicular over the centre of the tool, and exactly in the centre of its ſphere.

184 Another method by Cherubin.

Another method preſcribed by Cherubin is as follows. He takes a ſheet of very fine paper; and examining it carefully by looking upon it, and thro' it, he takes off with a ſharp pen-knife all the little lumps, hard parts, and inequalities, that he can find; then he ſoaks it in clean water; then he dries it between two fine linen cloths, tho' not ſo much as to make it quite dry, but to leave it dampiſh; then, with ſome very thin ſtarch or paſte, he daubs equably all over the ſurface of his tool as thin as poſſible, but ſome every where; then he lays on his paper very gently and ſlowly, letting it touch and ſtick firſt at one ſide, and by degrees more and more towards the middle, and at laſt ſo as to cover the whole. This is done ſlowly, in order to let the air get out; then, with the palm of his hand he preſſes the centre, and every where round about it towards the circumference, to make the paper ſtick every where; and this he does three or four times while it is drying, to get out all the air. He lets it dry of itſelf, then reviſes with his knife as before: then he hath a very coarſe bruiſer of glaſs, whoſe circumference is ſharply ground round, and at right angles to its ſurface, which he had coarſely ground before in the ſame tool. With this, and with a very heavy handle, he ſmooths and poliſhes and rubs off all the remaining inequalities of the paper; and when this is done, he lays on a ſtreak of tripoly, and poliſhes as in his other method.

Plate CCXXVII. fig. 7.

185 Mr Huygens's machines for poliſhing.

At CC is repreſented a ſquare beam of wood, a little longer than the diameter of the tool, and about $1\frac{1}{2}$ inch thick: the two extremities of it at C and C are bent downwards, and then are again directed parallel to the whole length, and ſerve for handles for the workman to lay hold of. In the middle of this beam there is fixed an iron ſpike, ſo long, that when the lower ſurfaces of the handles, C, C, are placed upon a plane, the point of the ſpike ſhall juſt touch the plane. This point preſſes upon the apex of the hollow cone, which deſcends through the hole in the ſlate, which, by the interpoſition of a cloth, was cemented to the glaſs B lying upon the tool A. To increaſe this preſſure, a ſort of bow, DED, is ſhaped out of a deal-board, half an inch thick, and five feet long, being ſeven inches broad in the middle, and tapered narrower towards its extremities, ſo as almoſt to end in a ſharp point. The middle of the bow is fixed to the floor by an iron ſtaple at E driven croſs it; and is bent into an arch by a rope FIIF; to which two other ropes are tied at I and I; the interval II being equal to the length of the beam CC. One of theſe ropes ICCG goes over the back of the beam CC, paſſing through a hole in each handle at C and C, and then is lapped round a cylindrical peg at G, that paſſes through two wooden chaps, to the bottom of which the other rope is tied that comes from the other I. So that, by turning the peg G, to lap the rope about it, the bow DD may be bent as much as you pleaſe. The tool A is placed upon a ſtrong ſquare board fixed to the table O on one ſide, and ſupported on the other ſide by the poſt P. Then the workman ſits down, and taking hold of the handles CC, he draws the glaſs to him and from him over the tool A, with a moderate motion; and after every 20 or 24 ſtrokes, he turns the glaſs a little about its axis. This way of poliſhing took up two or three hours, and was very laborious as well as tedious; becauſe the glaſs, being ſo much preſſed downwards, was moved very ſlowly.

Fig. 8.

Inſtead of the bow DD, Mr Huygens afterwards invented another ſpring by ſloping the flat ends of a couple of dealboards $\alpha\beta$, $\alpha\gamma$; and by nailing the flat ſlopes together very firmly, that the boards might make an acute angle $\beta\alpha\gamma$. One of theſe boards ſo joined was laid upon the floor under the poliſhing table, the ends $\beta\gamma$ being under the middle of the tool A. So that they lay quite out of the way of the workman, who before was a little incommoded by the ends of the bow DD. The boards at the end α were 8 or 10 inches broad, and from thence went tapering almoſt to a point at β and γ. The board $\alpha\gamma$ lying upon the floor, the end β, of the upper board, was pulled downwards by a rope $\beta\epsilon\zeta$ that paſſed under a pulley ϵ, fixed to the floor, and then was lapped round a ſtrong peg ζ that turned ſtiff in a hole in the floor. Under the end γ the middle of a ſtrong ſtick $\delta\gamma\delta$ was fixed at right angles to the board $\alpha\gamma$, and cords were tied to each end of this ſtick at δ, δ, which went over the poliſhing beam C, C, as in the former machine. This ſtick was lifted up but very little from the floor at the time of poliſhing; and by conſequence the ropes δC, δC were long enough to give liberty of motion to the poliſhing beam CC. Two iron pins θ, θ, paſſing through the ends of the boards at α, were ſcrewed into the floor; but the heads of the pins ſtood up above the boards, to give them liberty to riſe up when the rope $\beta\epsilon\zeta$ was ſtretched.

Fig.

To facilitate the labour of moving the glaſs backwards and forwards in the tool, Dr Smith made the following addition to the machine. At M is repreſented a ſtrong hand made of wood or iron, having a ſquare cavity cut through the bottom of it, for the poliſhing beam CC to paſs through, not tight, but at ſome liberty. To one ſide of this hand M is annexed a long board LL, by means of an iron bolt. The breadth of the lower ſurface of this board LL is equal to the breadth of the hand M, being $2\frac{1}{4}$ inches; its thickneſs is half an inch, and its length equal to three ſemidiameters of the tool. The board LL muſt be drawn backwards and forwards lengthwiſe over a block H firmly fixed to a table O; the thickneſs of the block being ſuch, that the board LL may lie an inch higher than the ſurface of the tool A. The wooden hooks at Π, and the pins at Σ, keep the motion of the board in the ſame direction, by hindering it from ſlipping either upwards or ſideways. Over this board, at right angles to it, and over the middle of the block H, there lies a wooden roller, having a ſtrong iron axis which turns in the holes of two iron plates fixed to the ends of the block. The thickneſs of the roller is about an inch and an half. Thro' two holes bored thro' this roller, and made wider at one end of them, two ſtrong cords are made to paſs with knots at one end of them, to be drawn into the wider parts of the holes, that they may neither ſlip through, nor ſtand out from the roller. Then each cord is lapped round the cylinder ſeveral times; and one end of each is pegged firmly into the board LL at the end towards M, and the other ends of them are lapped round a peg at N; which being turned round, will ſtretch the cords as much as you pleaſe. At one end of the axis of this roller there is a handle Q, which being turned round backwards and forwards alternately, the board LL with the glaſs annexed to it is moved to and fro, ſo far, that about a third part of its diameter ſhoots both ways over the margin of the tool.

The ſpike in the middle of the beam CC preſſes the glaſs a little obliquely, becauſe the hand M holds the beam CC, not tight, but ſomewhat looſely, to the end that the glaſs may paſs over the tool without trembling. Nevertheleſs this inclination of the ſpike muſt be very ſmall; and may eaſily be increaſed or diminiſhed ſeveral ways. Two pins or ſtops muſt be fixed to the under ſurface of the board LL, to determine the length of the ſtroke. The tool A, or rather the ſtone to which it is cemented, is ſqueezed faſt between the block H, and a ſtrong ſtop on the oppoſite ſide of the ſtone, by the interpoſition of a wedge. The workman ſits upon a round ſtool; and, when one hand is tired with turning the roller, he applies the other; and therefore is not ſo ſoon tired as with the other machine, which required both hands, and alſo a reciprocating motion of the whole body. A longer handle Q α was alſo made, which turned at both ends, for the convenience of uſing both hands at once.

After every 20 or 24 ſtrokes, it is neceſſary to give the glaſs a ſmall turn about its axis; which is eaſily done by laying hold of the ſlate fixed to it, with one hand, while the other hand goes on with the poliſhing motion. The tool muſt alſo be moved a little after every 25 or 50 ſtrokes, by drawing it half a ſtraw's-breadth towards that part of it which the glaſs has left, and by drawing it back again after as many more ſtrokes. At the beginning of the work the tripoly will be gathered into little lumps in ſome places of the tool, but will be diſperſed again in a little time; and then the area of the tool will become perfectly ſmooth. If the tripoly does not appear to ſtick equally to the glaſs in all parts, and to be diffuſed over it in ſlender ſtraight ſtreaks, the frying-pan with coals in it muſt be held over the tool again, till you perceive the area or coat of tripoly is not quite ſo cold as the other parts of the tool. Then let tripoly be rubbed upon the tool again, and let the glaſs be preſſed over it with your hand, to try whether it ſticks equally to the glaſs in every place. When it does, you may proceed in the work of poliſhing. But when vitriol is uſed inſtead of verdigreaſe, all that is ſaid about warming the tool may be omitted; becauſe theſe coats always touch the glaſs as they ſhould do, and ſtick better than before. The tool ought alſo, without being warmed, to be rubbed with tripoly over the coat, that the latter may be preſerved more entire, and that the glaſs may touch it better, which muſt always be repeated after 200 or 400 ſtrokes in poliſhing. The glaſs ſhould alſo be taken from the tool after 200 ſtrokes, by withdrawing the bolt L, which connects the hand M to the board LL, and by removing the beam CC. Then rub your finger upon the glaſs, or a clean rag, or a bit of leather, to examine how much it is poliſhed.

185
ethod of
unting
e ſtrokes
d in po-
ing.

To ſave the trouble of counting the ſtrokes, there is a wooden wheel Δ X, ſeven or eight inches broad, placed againſt a board fixed to the ſide of a wall. It turns eaſily about an axis, and has 24 teeth, like thoſe of a ſaw, which are puſhed round by a bended wire TYX in the following manner. The wire turns about a centre Y; and while one end of it is pulled by the ſtring TV tied to the end of the board LL, the oppoſite end YX puſhes back a long ſpring RS, fixed to the board at R; which, by preſſing upon the wire at S, cauſes the part YX to bend a little, and ſo the point X, in returning to the wheel (the ſtring being relaxed) falls a little lower into the next tooth, and puſhes it forward in the poſition repreſented in the figure. There is a ſpringing catch at Δ, which ſtays the wheel after every ſtroke at X. Laſtly, there is a pin fixed in the circumference of the wheel at Z, which, by preſſing the tail of a hammer, and letting it go again, cauſes a bell to ſound after every revolution of the wheel, and gives notice that the glaſs muſt be turned a little about its centre. It is eaſy to underſtand, that another piece of wheel-work, having three or four indexes, whoſe revolutions are in decimal progreſſion, may be fixed to the block H, and impelled by the ſtrokes of the board LL; by which means, without any trouble of counting, one may be informed how many ſtrokes go to poliſh a glaſs. A glaſs five or ſix inches broad requires about 3000 ſtrokes upon each ſurface to bring it to perfection. You muſt carefully examine the middle of the glaſs oppoſite to the blacking, whether any place appears darkiſh or of an aſh-colour; or whether any ſmall ſpots appears by an oblique reflection of the light of a candle, or of a ſmall beam of light let into a dark room; for the other parts of the glaſs will appear perfectly fine much ſooner than the middle.

After the glaſs has been ſufficiently poliſhed, let the ſtone, the cloth, and the cement, be warmed over a pan of charcoal, till the cement grows ſo ſoft that the glaſs may be ſeparated from it by a ſide-motion. Then, whatever cement remains upon the glaſs muſt be wiped off with a hot cloth dipped in oil or tallow, and laſt of all with cleaner cloths. Then if it does not appear perfectly poliſhed, (for we are often deceived in this point), the work muſt be repeated again, by glueing the glaſs to the ſlate as before; then it muſt be wiped very clean, and made a little rough, as we ſaid before. We muſt alſo lay a new fund, or coat, upon the tool, if the old one be ſpoiled; provided no other glaſs has been poliſhed in the tool in the mean time. The old fund may be waſhed off from the tool with a little vinegar. Laſtly, take care always to chooſe the thickeſt and cleareſt pieces of glaſs, to avoid a great many difficulties that ariſe from the unequal preſſure in poliſhing.

§ 3. *To Centre an Object-glaſs.*

A circular object-glaſs is ſaid to be truely centered when the centre of its circumference is ſituated in the axis of the glaſs, and to be ill centered when the centre of the circumference lies beſide the axis. Thus, let *d* be the centre of the circumference of an object-glaſs *a b c*; and ſuppoſe *e* to be the point where its axis cuts its upper ſurface. If the points *d* and *e* do not coincide, the glaſs is ill centered. Let *a f g* be the greateſt circle that can be deſcribed about the centre *e*; and by grinding away all the margin without this circle, the glaſs will become truely centered. The beſt method for finding the centre *e* which lies in the axis of the glaſs, according to Dr Smith, is as follows.

Plate CCXXVIII fig. 1.

187
How to know when a glaſs is ill-centered.
Fig. 2.

Let a couple of ſhort cylindrical tubes be turned in wood or braſs, and let the convexity of the narrower be ſo fitted to the concavity of the wider as juſt to turn round in it with eaſe, but without waddling; and let the planes of the baſes of the tubes be exactly perpendicular to their ſides. Place the baſe of the narrower tube upon a ſmooth braſs plate or a wooden board of an equal thickneſs; and with any ſharp-pointed tool deſcribe a true circle upon the board round the outward circumference of the baſe; and upon the centre of this circle, to be found when the tube is removed, deſcribe a larger circle upon the board. Theſe two circles ſhould be ſo proportioned, that the one may be ſomewhat greater, and the other ſomewhat ſmaller, than any of the glaſſes intended to be centered by them. Then, having cleared out all the wood within the inner circle, put the end of the tube into this hole, and there faſten it with glue, ſo that the baſe of the tube may lie in the ſurface of the board: then, having fixed the wider tube very firmly in a hole made in a window-ſhutter, and having darkened the room, lay the glaſs to be centered upon the board fixed to the narrower tube; and having placed the centre of it as nearly as you can gueſs over the centre of the hole, fix it to the board with two or three lumps of pitch, or ſoft cement, placed at its circumference. Then put the narrower tube into the wider as far as it can go, and fix up a ſmooth ſcreen of white paper to receive the pictures of objects that lie before the window; and when they appear diſtinct upon the ſcreen, turn the inner tube round upon its axis; and if the centre of the glaſs happens to be in this axis, the picture will be perfectly at reſt upon the ſcreen; if not, every point of it will deſcribe a circle. With a pencil mark the higheſt and loweſt places of any one circle, deſcribed by ſome remarkable point in that part of the picture which appears moſt diſtinct; and when this point of the picture is brought to the higheſt mark, ſtop the circular motion of the tube, and keeping it in that poſition depreſs the object-glaſs till the point aforeſaid falls exactly in the middle between the two marks. Then turn the tube round again, and the point of the picture will either reſt there, or will deſcribe a much ſmaller circle than before; which muſt be reduced to a quieſcent point by repeating the ſame operation. The centre of refraction of the glaſs will then lie in the axis of the tube, and by conſequence will be equidiſtant from the circumference of the large circle deſcribed upon the board fixed to it. Now to deſcribe a circle upon the glaſs *fgh* about its centre of refraction, let a long ſlender plate of braſs *acb* be bent ſquare at each end, as repreſented in the figure, leaving a piece in the middle equal in length to the diameter of the large circle *adbe* that was deſcribed upon the board; and let the ſquare ends of the plate be filed away, ſo that a little round pin may be left in the middle of each. Then, having laid it over the glaſs, along any diameter of the large circle *adbe*, make two holes in the board to receive the pins *a* and *b*; and find the centre of this circle upon the long plate. Then upon the centre *c*, deſcribe a circle as large as you can, upon the glaſs underneath, with a diamond-pointed compaſs, and grind away all the margin as far as this circle *fik*, in a deep tool for grinding eye-glaſſes; and then the glaſs will be truly centered. If the pitch or cement be too ſoft to keep the glaſs from ſlipping, while the circle is deſcribing, it may be fixed firmer with wax or harder cement.

188
How to correct the errors.

Plate CCXXVIII.

Fig. 3. repreſents a ſection of the object-glaſs *klm*, of the board *ab*, and of the tubes *cd* and *hi*, and of the window-ſhutter *no*. Imagine the plane of this ſection, or of the ſcheme, to paſs through *e*, a point in the glaſs which keeps its place while the reſt are turning round it by the motion of the tube. Let it alſo paſs through *l* the centre of refraction in the glaſs, and cut an object in the line PQR; then let a pencil of rays flowing from any point Q be collected to the focus *q* upon the ſcreen ST; and the points Q, *l*, *q*, will be in a ſtraight line deſcribed by the axis, or principal ray of the pencil. Draw Q, *e*, *f*, cutting the ſcreen in *f*; and while the tube is turning round, the line Q*lq* will deſcribe a conical ſurface whoſe axis is the fixed line Q*ef*; and therefore the focus *q*, or image of the point Q, will deſcribe a circle *qg*κ about *f*, to be found upon the ſcreen by biſecting the interval *q*κ between the higheſt and loweſt points of the circle. Now, as *f* is the centre of this circle, ſo *e* is the centre of another circle deſcribed by *l*: therefore by depreſſing the glaſs *kl* along the ſurface of the board *ab*, till the image *q* falls upon the mark *f*, the point *l* will be depreſſed to *e* the centre of motion; and then it will be in the axis of the tube, and conſequently equidiſtant from the circumference of the circle deſcribed on the board *ab*; and here it is plain that the image *q* will be at reſt in the point *f*. It is not neceſſary for the accuracy of the practice, that the point Q ſhould be in the axis of the glaſs. For in fig. 7. (Plate CCXXII.) if the glaſs KLM be turned about its axis QL*q*, the image *p* of any collateral point P will remain at reſt; becauſe the points PL are at reſt, and the axis PL*p* of the oblique pencil is a ſtraight line.

189
Advantages of a well centered glaſs.

The chief advantage of having a glaſs well centered is this, that the rays coming through any given hole, whoſe centre coincides with the axis of the glaſs, will form a diſtincter image than if that centre lay beſide the axis; becauſe the aberrations of the rays from the geometrical focus of the pencil, are as the diſtances of their points of incidence from the centre of refractions in the glaſs.

If the picture be received upon the unpoliſhed ſide of a piece of plane glaſs, inſtead of the paper ST, its motion may be diſcerned more accurately by viewing it from behind through a convex eye-glaſs; as in a teleſcope where croſs hairs are uſually ſtrained over a hole put into the place of the rough glaſs. Therefore as object-glaſſes are commonly included in cells that ſcrew upon the end of the tube, one may examine whether they be pretty well centered, by fixing the tube, and by obſerving, while the cell is unſcrewed, whether the hairs keep fixed upon the ſame lines of an object ſeen through the teleſcope.

§ 4. *Of the Compoſition of the Metals for the Specula of Reflecting Teleſcopes.*

The properties required in the metal for the ſpeculum of a reflecting teleſcope are, whiteneſs, hardneſs, and immunity from ruſt, or at leaſt that it may be as little liable to tarniſh as poſſible. Various compoſitions have been recommended; but the beſt is that publiſhed by Mr Mudge in the Phil. Tranſ. for 1777. His metal is a compoſition of copper and tin, in the proportion of two pounds of the former to 14½ ounces of the latter. If the proportion of tin was increaſed only by a ſingle half ounce, the metal became ſo hard that

190
Mr Mudge's compoſition for ſpecula.

OPTICS. Plate CCXXVIII.

Fig. 1.

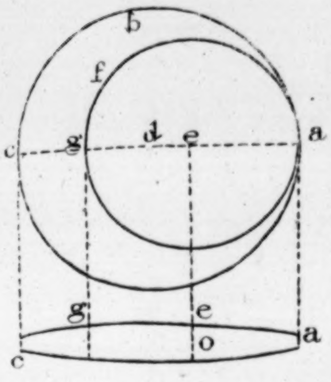

b
f
c
g
d
e
a
g
e
a
c
o

Fig. 2.

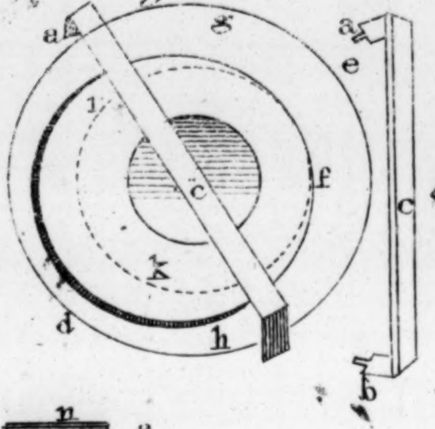

a
g
e
i
c
f
k
d
h
c
b

Fig. 3.

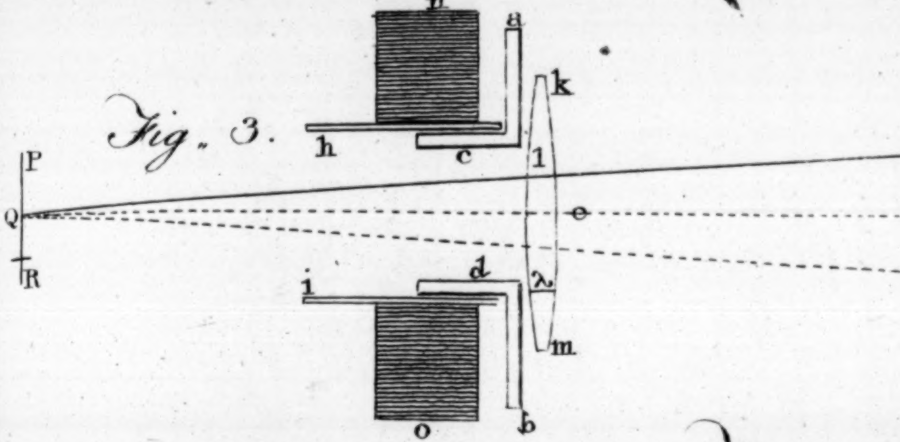

n
a
k
h
c
l
P
Q
R
e
i
d
λ
m
o
b

Fig. 4.

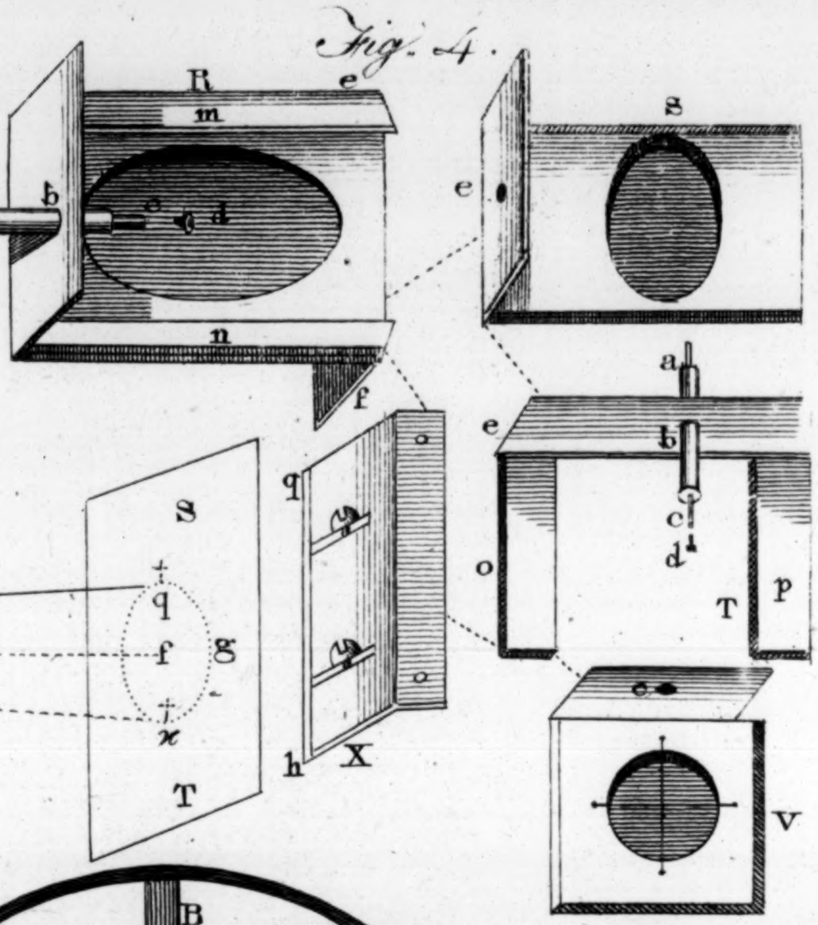

R
e
m
a
b
c
d
n
f
S
e
S
q
f
g
κ
T
q
h
X
a
e
b
c
d
o
T
p
e
V

Fig. 5.

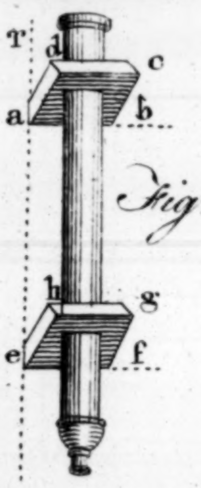


Fig. 6.

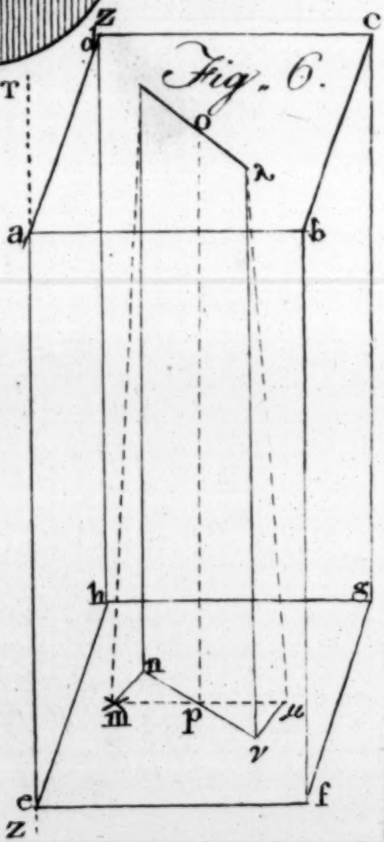

z
d
c
r
o
λ
a
b
h
g
n
m
p
μ
ν
e
f
z

Fig. 7.

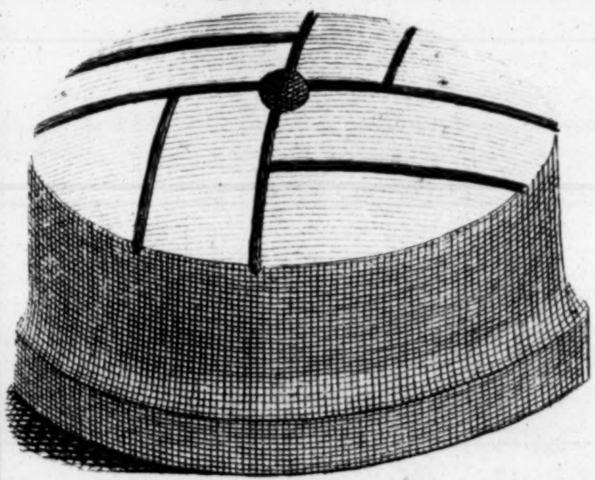


Fig. 8.

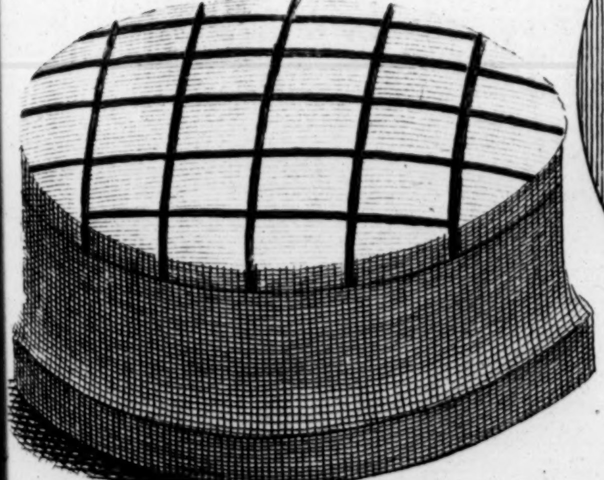
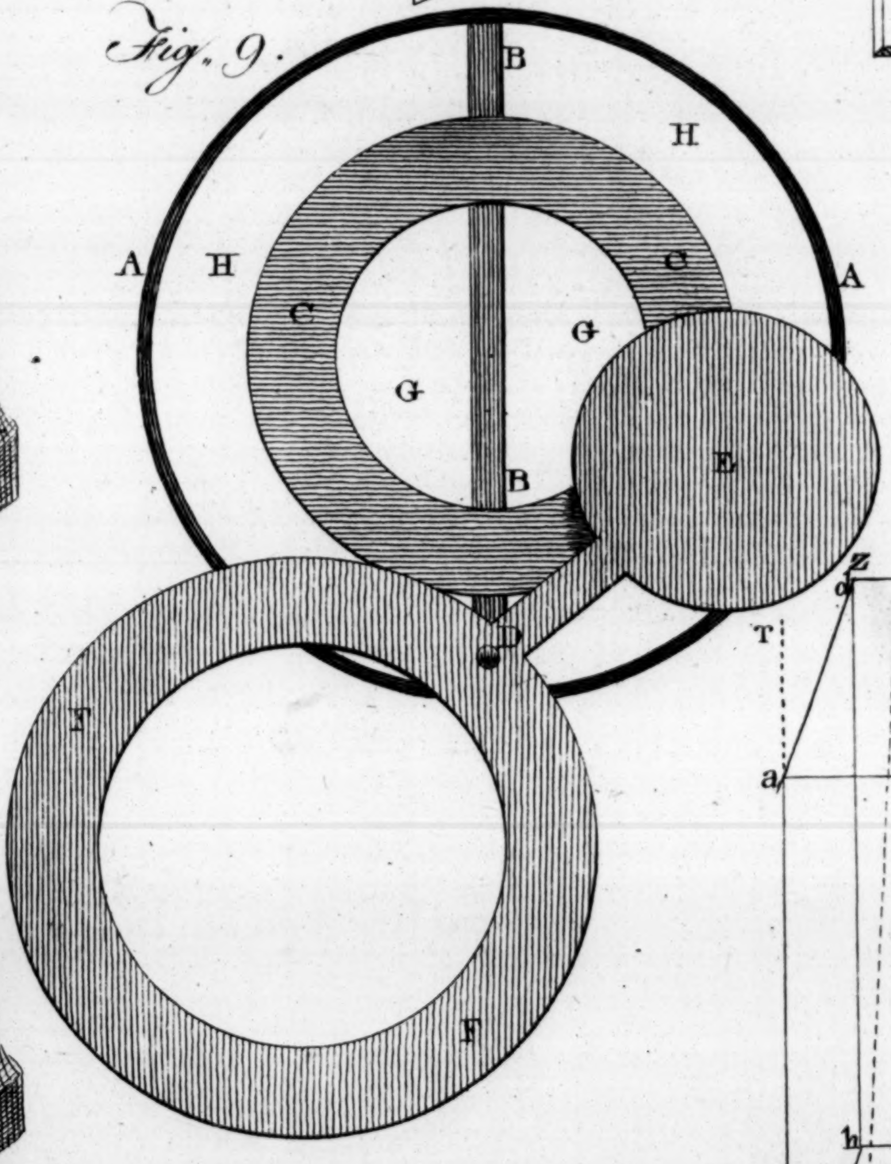


Fig. 9.


B
H
A
H
C
C
A
G
G
B
E
D
F
F

A Bell Sculp.

3 MA 53

it could not be poliſhed. Nevertheleſs he tells us, that one Mr Jackſon, a mathematical inſtrument-maker, uſed the tin in as large a proportion as one third of the whole. This indeed gives the metal its utmoſt whiteneſs, but at the ſame time renders it ſo exceedingly hard, that the fineſt waſhed emery will not cut it without breaking up its ſurface; and the common blue ſtones uſed in grinding ſpecula will not touch it. With great pains, however, Mr Jackſon found a ſtone which would work upon this metal, and was at the ſame time of a texture ſufficiently fine not to injure its ſurface; but what this ſtone was, or where it was to be found, he would not diſcover.

Another very eſſential property in the metal for ſpecula is its compactneſs; and in this every one of thoſe formerly tried was deficient; neither was Mr Mudge able to remove this defect till after a great many experiments. Sometimes, indeed, he ſays that he ſucceeded in caſting a ſingle metal, or perhaps two or three, without this imperfection; but moſt frequently he was unſucceſsful, without his being in any degree able to aſſign a reaſon. The pores were ſo very ſmall, that they were not perceptible when the metal had received a good face and figure upon the hones, nor till the laſt and higheſt poliſh had been given: then it frequently appeared as if duſted over with millions of microſcopic pores, which were exceedingly prejudicial in two reſpects; for, firſt, they became in time a lodgement for a moiſture which tarniſhed the ſurface; and, ſecondly, on poliſhing the ſpeculum, the putty neceſſarily rounded off the edges of the pores, in ſuch a manner as to ſpoil a great part of the metal, by the loſs of as much light and ſharpneſs in the image as there were defective points of reflection in the metal; and, to add to the misfortune, this fault was not diſcovered till a great deal of pains had been taken in grinding, and even poliſhing the ſpeculum; which was at once rendered uſeleſs by this mortifying diſcovery.

At laſt Mr Mudge was extricated from theſe difficulties by accident. Having made a great number of experiments, and entirely exhauſted his copper, he recollected that he had ſome metal which was preſerved out of curioſity, and was part of one of the bells of St Andrew's which had been recaſt. This he melted with a little freſh tin, and, contrary to his expectation, it turned out perfectly free from pores, and in every reſpect as fine a metal as could be deſired. At firſt he could not account for this ſucceſs, but afterwards diſcovered it by reflecting on the circumſtances of his proceſs. He had always melted the copper firſt, and, when it was ſufficiently fuſed, he added the proportional quantity of tin; and as ſoon as the two were mixed, and the ſcoria taken off, the metal was poured into the moulds. He now began to conſider that putty was calcined tin, and ſuſpected that the exceſſive heat which copper neceſſarily undergoes before fuſion, was ſufficient to reduce part of the tin to this ſtate of calcination, which therefore might fly off from the compoſition in the ſtate of putty, at the time the metal was poured out. On this idea he furniſhed himſelf with ſome more Swediſh copper and grain-tin. The former he melted as uſual, and mixed the tin along with it, caſting the mixture into an ingot. This was porous, as he had expected; but after a ſecond fuſion, it became perfectly cloſe; nor, after this, did he ever meet with the above-mentioned imperfection in a ſingle inſtance. All that is neceſſary to be done, therefore, in order to procure a metal with the requiſite properties for a ſpeculum, is to melt the copper and tin in the above-mentioned proportions; then, having taken off the ſcoria, caſt it into an ingot. This metal muſt be a ſecond time melted to caſt the ſpeculum; but as it will fuſe with a ſmall heat in this compound ſtate, it ſhould be poured off as ſoon as melted, giving it no more heat than is abſolutely neceſſary. It muſt be obſerved, however, that the ſame metal, by frequent melting, loſes ſomething of its hardneſs and whiteneſs; when this is this caſe, it becomes neceſſary to enrich that metal by the addition of a little tin, perhaps of half an ounce to a pound. And indeed, when the metal is firſt made, if, inſtead of adding the 14½ ounces of tin to the copper all at once, about an ounce of the former is reſerved, and added to it in the ſecond melting, the compoſition will be more beautiful, and the grain much finer. That the metal may have a good ſurface, it is neceſſary, before it is poured off, to throw into the crucible a ſpoonful of charcoal-duſt; immediately after which the metal muſt be ſtirred with a wooden ſpatula, and poured into the moulds.

§ 5. *Of preparing the Moulds; Grinding, Caſting, and Poliſhing, the Metal.*

191
Dr Smith's method of making the gauges.

For this purpoſe Dr Smith preſcribes the following method. "Having in the firſt place conſidered of what length one would propoſe the inſtrument to be, and conſequently what diameter it will be neceſſary to give to the large ſpeculum, for which there are ample inſtructions by Sir Iſaac Newton's table in the Philoſophical Tranſactions aforeſaid, allowing about an inch more than the aperture in the table for the falſe figure of the edges, which very often happens; I ſay, having determined theſe things, take a long pole of fir deal, or any wood, of a little more than double the length of the inſtrument intended, and ſtrike through each end of it two ſmall ſteel points, and by one of them hang up the ſame againſt a wall perpendicularly; then take two pieces of thin plate-braſs well hammered, a little thicker than a ſixpence; theſe may be about an inch and a half broad, and let their length be in reſpect of the diameter of the ſpeculum as 3 to 2, *viz.* if the ſpeculum be 8 inches diameter, theſe may be about 12. Fix each of theſe ſtrongly with rivets between two thin bits of wainſcot, ſo that a little more than a quarter of an inch in the breadth may ſtand out from between the boards. Then fix up theſe pieces horizontally againſt the wall under your pole; and therewith, as with a beam compaſs, ſtrike an arch upon each of them: then file each of them with a ſmooth file to the arch ſtruck, ſo as one may be a convex and the other a concave arch of the ſame circle. Theſe braſſes are the gauges to keep the ſpeculum, and the tools on which it is ground, always to the ſame ſphere. And that they may be therefore perfectly true to each other, it is neceſſary to grind them with fine emery one againſt the other, laying them on a flat table for that purpoſe, and fixing one of them to the table.

192
Of making the moulds for the ſpeculum.

"When the gauges are perfectly true, let a piece of wood be turned about 2-tenths of an inch broader than the intended ſpeculum, and ſomewhat thicker, which it is beſt to caſt in no caſe leſs than 2 tenths of an inch thick, and for ſpecula of 6, 8, or 10 inches broad, this ſhould be at leaſt 3 or 4 tenths thick when finiſhed. This board being turned, take ſome common pewter, and mix with it about $\frac{1}{10}$ of regulus of antimony; and with that wooden pattern caſt one of this pewter, which will be conſiderably harder than common pewter. Let this pewter pattern be truly turned in a lathe, and examined by means of the gauges aforeſaid, as a pattern for caſting the ſpecula themſelves; and take care when it is turned that it be at leaſt $\frac{1}{20}$ of an inch thicker, and about $\frac{1}{10}$ of an inch broader, than the ſpeculum intended to be caſt therefrom.

"The manner of making the moulds for caſting is now to be explained; and will ſerve for a direction as well for caſting this pewter pattern, as aftewards for caſting thereby the ſpeculum itſelf. The flaſks had beſt be of iron, and muſt be at leaſt two inches wider every way than the ſpeculum intended. In each flaſk there ſhould be the thickneſs at leaſt of one inch of ſand. The caſting-ſand which the common founders uſe from Highgate, will do as well as any; and any ſand will do which is mixed with a ſmall proportion of clay to make it ſtick. The ſand ſhould be as little wet as may be, and well beaten but not too hard. The ingates ſhould be cut ſo as to let the metal flow in, in four or five ſtreams, over the whole upper part of the mould; otherwiſe whatever pores happen in the metal will not be ſo equally diſperſed as they ſhould be over the whole face of the metal, theſe pores generally falling near the ingate ſtreams. Let the flaſks dry in the ſun for ſome hours, or near a very gentle fire; otherwiſe they will warp, and give the ſpeculum, when caſt, a wrong figure. For beſides ſaving the trouble in grinding, it is beſt on many accounts to have the ſpeculum caſt of a true figure; and it is for this reaſon, that it is beſt to caſt it from a hard pewter pattern, and not from a wooden one as founders uſually caſt."

193
Dr Smith's method of rough-grinding the ſpeculum.

With regard to the proper metal, opticians have been greatly at a loſs, till of late that Mr Mudge has diſcovered a compoſition which anſwers every purpoſe as well as can be expected, and of which an account hath been already given. "The metal being duely caſt, the ſurface of it is to be ground quite bright upon a common grindſtone; keeping it, by means of your convex gauge, as near the figure as may be. When all the outward ſurface and ſand-holes, falſe parts, and inequalities, are ground off, then provide a good thick ſtone; a common ſmall grindſtone will do very well. Let its diameter be to the diameter of the ſpeculum as 6 to 5: with another coarſe ſtone and ſharp ſand or coarſe emery rub this ſtone till it fits the concave gauge; and then with water and coarſe emery at firſt, and afterwards with finer, rub your ſpeculum upon this ſtone until it forms itſelf into a true portion of a ſphere fitting your convex gauge. A different method of moving the metal upon the ſtone will incline it to form itſelf ſomewhat of a ſmaller or larger ſphere. If it be ſtruck round and round, after the manner of glaſs-grinders, the ſtone will wear off at the outſides, and the metal will form itſelf into the portion of a leſs ſphere. If it be ſtruck croſs and croſs the middle, it will flat the ſtone, and become ſomewhat of a larger ſphere. There ſhould be uſed but very little emery at a time, and it ought to be frequently changed; otherwiſe the metal will always be of a ſmaller ſphere than the ſtone, and will hardly take a true figure, eſpecially at the outſide. For the better grinding the metal, it is neceſſary, that this ſtone ſhould be placed firm upon a ſtrong round board fixed firmly on a poſt to the floor, as is uſual with glaſs-grinders; and the ſame table or pillar will ſerve for the further grinding and poliſhing the ſpeculum.

"When the metal is caſt and rough-figured, which ſhould be done with taking off as little of the ſurface of the metal as poſſible, (becauſe that cruſt ſeems generally to be harder and more ſolid than the inner parts) the ſides and back of it ſhould be ſmoothed and finiſhed; leſt the doing that afterwards ſhould make the metal caſt, and ſpoil the figure of the foreſide.

194
Inſtruments requiſite for poliſhing the metal.

"A round braſs plate muſt be caſt of ſufficient breadth and thickneſs (for a ſpeculum of ſix inches in diameter Mr Hadley uſed a braſs plate 8 or 9 inches broad, and half an inch thick.) Let one ſide be turned to the concavity you deſign your ſpeculum to have, on the other ſide let it have ſuch an handle faſtened as may make it eaſily manageable. This handle ſhould be as ſhort as conveniently it can, and be fixed to the plate's back rather by ſome other method than either by ſcrewing it into a hole in the metal, or by a broad ſhoulder ſcrewed againſt the back of it, for fear of bending the plate. Have ready a round marble of about $\frac{1}{8}$ or $\frac{1}{10}$ broader than the braſs plate, and an inch or an inch and a quarter thick: let this be cut by a ſtone-cutter to the ſame convexity on one ſide as the concavity of the plate, and then grind it with the plate and emery till all the marks of the chiſel are out. This marble is to be covered with pieces of the fineſt blue hone or whetſtone, chooſing thoſe that are neareſt of a breadth and thickneſs; but chiefly thoſe that when wetted appear moſt even and uniform in their colour and grain. They are to be cut into ſquare bits; and theſe, having each one ſide ground concave on the convex marble with emery or fine ſand, are to be fixed cloſe down on it with ſome tough and ſtrong cement in the manner of a pavement, leaving a ſpace of a ſmall ſtraw's breadth between each; their grain being likewiſe placed in an alternate direction, as repreſented in the figure. I chooſe rather to diſperſe the ſquares that come out of the ſame whetſtone, than to keep them together. They muſt then be reduced to one common convex ſurface to fit the braſs plate; and if the cement happen to riſe any where between them, ſo as to come up even with the ſurface, it muſt be dug out; and ſo, from time to time, as often as the hones wear down to it. Upon theſe ſquare pieces of whetſtone the laſt figure is to be given to the ſpeculum.

Plate CCXXVIII. fig. 9.

"Beſides theſe, there will be wanted for the laſt poliſh, either a very thick round glaſs plate, (its diameter being about the middle ſize between that of the braſs tool and the ſpeculum itſelf,) or if that cannot be procured of near half an inch in thickneſs, a piece of true black marble of the eveneſt grain and freeſt from white veins or threads, may do in its ſtead. This glaſs or marble muſt be figured on one ſide to the braſs tool likewiſe, and is to ſerve for finiſhing of the poliſh of the ſpeculum, when covered with ſarcenet as ſhall be directed.

"A ſmaller braſs or metal plate of the ſame concavity with the larger will be uſeful, as well to help to reduce the figure of the hones whenever it appears to be too convex, as to ſerve for a bruiſer to rub down any gritty matter happening to be amongſt your putty before you put the ſpeculum on the poliſher, when you renew the powder. Any of the ſpeculums which prove bad in caſting, will ſerve for this purpoſe.

"When all is thus far ready, let the marble with the blue hones be fixed in ſuch a manner that it may be often waſhed during your work, by throwing upon it about half a quarter of a pint of water at a time without inconvenience. Then place the braſs tool on the hone pavement; and rub it backwards and forwards with almoſt a direct motion; yet carrying it by turns a little to the right and left, ſo as to go a little over the edges of the pavement every way, regularly turning the tool on its own axis, and alſo changing the direction of the ſtroke on the hones. This continue, keeping them always very wet, till you have got out all the rings remaining in the plate from the turning, and the blackneſs from grinding the marble or glaſs in it; and, towards the latter end, often waſhing away the mud which comes from the whetſtones. When this is done, lay the braſs tool down, and in it grind again with fine emery the glaſs or marble deſigned for the laſt poliſher, giving it as true a figure as poſſible.

"Chooſe a piece of fine ſarcenet as free from rows and great threads as you can. Let it be three or four inches broader than the glaſs or marble; and turn down the edges of the ſarcenet round the ſides of the glaſs, &c. Strain it by lacing it on the backſide as tight and ſmooth as you can, having firſt cleared it of all wrinkles and folds with a ſmooth iron, and drawn out the knots and gouty threads. Then wet it all over as evenly as you can with a pretty ſtrong ſolution of common pitch in ſpirit of wine; and when the ſpirit is dried out, repeat the ſame; and if any bubbles or bliſters appear under the ſarcenet, endeavour to let them out with the point of a needle. This muſt be repeated till the ſilk is not only ſtuck every where firmly down to the glaſs or marble, but is quite filled with the pitch. A large painter's pencil, made of ſquirrel's hair, is of uſe for ſpreading this varniſh equally on the ſilk, eſpecially when it begins to be full. It muſt then be ſet by for ſome days, for the ſpirit to dry well out of it, and the pitch to harden, before any thing more be done to it. If you do not care to wait ſo long, the pitch may be melted into the ſilk without diſſolving it in ſpirits. In order to this, ſtrain a ſecond thin ſilk over the firſt, but you need not be curious in the choice of it; and having heated all together as hot as you think the ſilk or glaſs will ſafely bear, pour on it a little melted pitch (firſt ſtrained through a rag) ſo much as you judge ſufficient to fill both ſilks; it muſt be kept hot for ſome time till the pitch ſeems to have ſpread itſelf evenly all over. If you cannot get it to ſink all into the upper ſilk, but it ſtands above it any where, it is a ſign that there was too much pitch laid on, which ſhould be taken away in thoſe places while it remains liquid, with a hot rag preſſed down on it. When all is cold again, ſtrip off the outward ſilk, and cut away the uſeleſs looſe edges of the inward. To take off the ſuperflous pitch where it lies too thick, and reduce the whole to a regular ſurface, it muſt be rubbed in the braſs tool with a little ſoap and water, till they are coloured of a pretty deep brown with the pitch; then waſh them away, and repeat the ſame with more ſoap and water, till the weaving of the ſilk appears every where as equally as you can make it. As this work takes up ſome time, you may expedite it by putting a few drops of ſpirit of wine to the ſoap and water (which will help them to diſſolve and wear away the pitch ſomewhat faſter till it comes towards a concluſion; and if there are any places where the pitch lies very thick, you may ſcrape it away with a ſharp knife.

This poliſher muſt be carefully kept from all duſt and grit, but particularly from emery and filings of hard metals, and therefore ſhould not be uſed in the place where the others come. After they have ſerved a good while, they are more apt to ſleek the metals than at firſt; to prevent which, their ſurfaces may be taken off by rubbing them with ſoap and water in the tool as before, and then ſtriking them over once or twice with the abovementioned ſolution of pitch with a pencil, proceeding as before; only that you muſt not now put any ſpirit to your ſoap and water, nor will you need to change them above once or twice.

"You may now begin to give the figure to your ſpeculum on the hones, rubbing it and the braſs tool on them by turns, till both are all over equally bright; having firſt fixed on to the middle of the back of your ſpeculum a ſmall and low handle, with only pitch ſtrained through a rag. For of all cements, that ſeems the leaſt apt to bend the metals in ſticking theſe handles, &c. on them.

195
Method of giving the laſt poliſh.

"The poliſher being fixed likewiſe in a proper manner for your work, rub either the metal itſelf, or rather the before-mentioned bruiſer, being firſt alſo figured on the hones, with a little putty, waſhed very fine, and fair water, till it begins to ſhew ſome poliſh. Then if you find it takes the poliſh unequally, that is, more or leſs about the edges than in the middle, it is a ſign the braſs tool and metal, &c. are more or leſs concave than to anſwer the convexity of the poliſher; and muſt be reduced to the curvature of this, rather than to attempt an alteration in the figure of the poliſher, which would be a much more difficult as well as laborious work. If the ſpeculum appears too flat, the larger braſs tool muſt be worked on the hones for ſome time, keeping its centre near their circumference, with a circular motion; but concluding for four or five minutes with ſuch a motion as was before deſcribed. Then figure the metal anew on the hones, and try it again on the poliſher as before. If the metal be too concave, the ſurface of the hones may be flatted by rubbing the ſmaller braſs plate, or the before-mentioned ill-caſt metal, on the middle of them; with a direct but ſhort ſtroke, ſo as but juſt to reach over their circumference with the edge of it. Then the larger braſs is to be worked on them in the ſame manner; and laſt of all the metal to be poliſhed. When you find the braſs tool and hones, &c. anſwer the curvature of the poliſher, you may then examine the truth of the figure of the ſpeculum more ſtrictly, to avoid the loſs of time and labour in finiſhing its poliſh while the figure is imperfect.

"Place

Plate CCXXVII. fig. 10.

196 Method of examining the true figure of the ſpeculum.

“ Place the ſpeculum in a vertical poſture on a table about $3\frac{1}{2}$ or 4 feet from the floor. On another table ſet a candle whoſe flame ſhould be about the level of the middle of the ſpeculum, and very near the centre of its concavity. About $\frac{1}{2}$ an inch before the flame, place a flat tin, or thin braſs, plate about 3 inches broad, but 4 or 5 high, having ſeveral holes about the middle, of different ſhapes and ſizes; ſome of them as ſmall as the point of the ſharpeſt needle will make them, the biggeſt about the ſize of a large muſtard-ſeed: darken the room, and move this candle and plate about on the table, till the light from the brighteſt part of the flame, paſſing through ſome of the larger holes to the ſpeculum, is reflected back ſo as to form the images of thoſe holes cloſe without one of the ſide-edges of that thin plate. Thoſe largeſt images in this caſe will be viſible, (although the ſpeculum have no other poliſh than what the hones give it), when received on a thick white card held cloſe to that edge of the plate, if the back of the card be either blacked or ſo ſhaded that the candle may not ſhine through it, and the eye be alſo ſkreened from the candle's direct light. If any difficulty happens in diſcerning them, the plate may be removed, and the image of the whole flame will be eaſily ſeen. Have ready an eye-glaſs whoſe focal diſtance may be ſomething greater than the double of that of the eye-glaſs you intend for the inſtrument when finiſhed: you may try ſeveral at your diſcretion. Let this be ſupported by a ſmall ſtand moveable on the table, and capable of raiſing and ſinking it as the height of the flame requires, and of turning it into any direction. By means of this ſtand, bring the eye-glaſs into ſuch a poſition, that the light from ſome of the holes, after its reflection from the ſpeculum, may be received perpendicularly on its ſurface; and that its diſtance from the ſpeculum be ſuch, that the reflected images of the holes may be ſeen diſtinctly through it, near the edge of the thin plate, by the light coming immediately from the ſpeculum: guide the candle and thin plate with one hand, and the ſtand carrying the eye-glaſs with the other, till you have got them into ſuch a ſituation, that you ſee diſtinctly at the ſame time, through the eye-glaſs, the edge of the thin plate, and the image of one of the holes cloſe to it. Meaſure the exact diſtance of the middle of the ſpeculum from the thin plate directly againſt the flame, and alſo from the edge cloſe to which you ſee the image of the hole. If theſe meaſures are the ſame, ſet it down as the exact radius of concavity of your ſpeculum, and proper curvature for any that are to be poliſhed on your poliſher, though that will allow ſome latitude: if the meaſures aforeſaid differ, take the mean between them.

“ You will now alſo judge of the perfection of the ſpherical figure of your metal by the diſtinctneſs with which you ſee the repreſentations of the holes, with their raggedneſs, duſts, and ſmall hairs ſticking in them; and you will be able to judge of this more exactly, and likewiſe to diſcover the particular defects of your ſpeculum, by placing the eye-glaſs ſo as to ſee one of the ſmalleſt holes in or near its axis; and then by ſhoving the eye-glaſs a very little forward towards the ſpeculum, and pulling it away, by turns, letting the candle and plate ſtand ſtill in the mean time. By this means you will obſerve in what manner the light from the metal comes to a point, to form the images, and opens again after it has paſt it. If the area of the light, juſt as it comes to or parts from the point, appears not round, but oval, ſquariſh, or triangular, &c. it is a ſign that the ſections of the ſpecular ſurface, through ſeveral diameters of it, have not the ſame curvature. If the light, juſt before it comes to a point, have a brighter circle round the circumference, and a greater darkneſs near the centre, than after it has croſſed and is parting again; the ſurface is more curve towards the circumference, and flatter about the centre, like that of a prolate ſpheroid round the extremities of its axis; and the ill effects of this figure will be more ſenſible when it comes to be uſed in the teleſcope. But if the light appears more hazy and undefined near the edges, and brighter in the middle before its meeting than afterwards, the metal is then more curve at its centre and leſs towards the circumference; and if it be in a proper degree, may probably come near the true parabolic figure. But the ſkill to judge well of this, muſt be acquired by obſervation.

“ In performing the foregoing examination, the image muſt be reflected back as near the hole itſelf as the eye's approach to the candle will admit of, that the obliquity of the reflection may not occaſion any ſenſible errors: in order to which, the eye ſhould be ſkreened from the candle; and the glaring light, which may diſturb the obſervation, may be ſtill more effectually ſhut out, by placing a plate, with a ſmall hole in it, in that focus of the eye-glaſs which is next the eye. *A* is the ſpeculum, *B* the candle and plate with the ſmall holes, *C* the cell with the eye-glaſs and plate behind it. Fig. 10.

“ Inſtead of the flame of the candle and plate with ſmall holes, I ſometimes made uſe of a piece of glaſs thick ſtuck with globules of quickſilver, ſtrained thro' a leather, and allowed to fall on it in a dew; placing this glaſs near a window, and the ſpeculum at a diſtance on the ſide of the room, being itſelf and every thing about it as much in the dark as can be. The light of the window reflected from the globules of mercury, appearing as ſo many ſtars, ſerves inſtead of the ſmall holes, with this advantage, that the reflection from the metal may be very near at right angles.

197 Of correcting the errors.

“ If the figure of the metal appears not ſatisfactory, the hones muſt be worked with the braſs tool and water for 2 or 3 minutes with the motion, &c. firſt directed; then work the metal on them with the like motion, and ſuch length of the ſtroke as may carry the edge of it about $\frac{1}{6}$ or $\frac{1}{4}$ of its diameter beyond that of the hone pavement each way; carry it likewiſe by turns to the right and left, to about the ſame diſtance. Continue this about 5 minutes, not preſſing the metal down to the hones with any more than its own weight, and obſerve that the oftener the mud is waſhed away, the more truly ſpherical the figure of the ſpeculum will generally be: but the leaving a little more of this mud on the ſtones has ſometimes ſeemed to give the metal a parabolic figure. I have likewiſe given it the ſame, by concluding with a kind of ſpiral motion of the centre of the metal, near the circumference of the hones, in the manner repreſented in fig. 11. for about half a minute.

“ If after ſeveral trials the metal appears to have always the ſame kind of defect, and anſwering to the ſame particular part of the metal, it is a ſign of a different hardneſs in its ſeveral parts, which will make it very difficult to bring that ſpeculum to perfection. In working the tools or metals on the hones, there will often appear little ſpots in them, much blacker and harder than the reſt; theſe muſt be dug out as faſt as they appear.

"When the figure is to your mind, you may proceed to finiſh the poliſh on the ſarcenet with very little putty, and that diluted with a great deal of water. Before you put the putty and water on it, obſerve, by holding it very obliquely between your eyes and the light, if it have any liſts or ſtripes acroſs it, which appear more gloſſy than the reſt. If it be ſo, let the motion of the metal in poliſhing be directly athwart theſe liſts, and not along with them, nor even circular. In other reſpects you may obſerve the ſame directions as were before given for its motion on the hones; not forgetting, after every 15 or 20 ſtrokes, to turn it on its axis about $\frac{1}{12}$ or $\frac{1}{18}$ of a revolution. As the poliſher grows dry, you will find the metal ſtick to it more and more ſtiff; at which time it both poliſhes faſter and with a better gloſs: only take care that it grows not ſo dry as for the metal to take hold of the ſarcenet and cut it up, or for the pitch and putty to fix in little knobs here and there on it; which, if it happen, will preſently ſpoil the figure. As faſt therefore as the ſarcenet appears to be growing dry at any of its edges, touch the place with the end of a feather dipped in clean water: you may uſe the ſame putty at leaſt half an hour. As often as you change it, waſh the old clean away, and rub the new about firſt with your bruiſer, to ſee if there be any gritty or groſs particles in it, and rub them away for fear of ſcratching the metal; then laying down the edge of the ſpeculum a little way on the edge of the poliſher, where it is well covered with water, ſlide it on the middle, and then proceed. The leſs putty you uſe at a time, the ſlower the work will advance; but if you uſe too much, it will ſpoil a little of the figure round the edges. It will not want any conſiderable force to preſs it down; but if it be of 5 or 6 inches diameter or more, it will be very laborious to go through the poliſh without ſome kind of machine."

Mr Mudge is of opinion that all this troubleſome method is entirely unneceſſary, and of the ſame opinion is an anonymous French author who wrote on this ſubject in the year 1738. The latter tells us what is certainly agreeable to reaſon and experience, that the more complicated the machines are by which we attempt to accompliſh any purpoſe, the more liable we are to error by reaſon of their perpetual tendency to go wrong, and the neceſſary multiplication of inaccuracy is a complicated motion. Four tools, according to Mr Mudge, are all that are neceſſary; viz. the rough grinder to work off the rough face of the metal; a braſs convex grinder, on which the metal is to receive its ſpherical figure; a bed of hones, which is to perfect that figure, and to give the metal its ſmooth fine face; and a concave tool or bruiſer, with which both the braſs grinder and the hones are to be formed. A poliſher may be conſidered as an additional tool; but as the braſs grinder is uſed for this purpoſe, and its pitchy ſurface is expeditiouſly and without difficulty formed by the bruiſer, the apparatus is therefore not enlarged.

198 Of rough grinding the ſpeculum.

The tool by which the rough ſurface of the metal is rendered ſmooth and fit for the hones, is beſt made of lead ſtiffened with about a ſixth part of tin. This tool ſhould be at leaſt a third more in diameter than the metal which is to be goound; and for one of any ſize, not leſs than an inch thick. It may be cemented upon a block of wool, in order to raiſe it higher from the bench. This leaden tool being caſt, it being fixed in the lathe, and turned as true as poſſible by the gauge to the figure of the intended ſpeculum, making a hole or pit in the middle for a lodgement to the emery, of four inches; when this is done, deep grooves muſt be cut acroſs its ſurface with a graver, as is repreſented fig. 7. Theſe grooves will ſerve to lodge the emery, and by their means the tool will cut a great deal faſter. There is no reaſon to fear any alteration in the convexity of this tool by working the metal upon it; for the emery will bed itſelf in the lead, and ſo far arm the ſurface of it, that it will preſerve its figure, and cut the metal very faſt. Any kind of low handle, fixed on the back of the metal, with ſoft cement, will be ſufficient; but it ſhould cover two thirds of its back, to prevent its bending. "This way of working (ſays Mr Mudge) will cut the metal faſter, and with more truth, than the method deſcribed by Dr Smith; for ſhould the ſurface and rough parts be attempted to be ground off by a common grindſtone by hand, though you did it as near the gauge as poſſible, yet the metal would be ſo much out of truth when applied to the ſucceding tool, that no time would be ſaved by it." For this purpoſe Mr Mudge uſed to employ a common labourer, who ſoon acquired ſuch dexterity at working upon the tool, that in two hours time he would give a metal of four inches dimeter ſo good a face and figure as even to fit it for the hones.

Plate CCXXVIII.

When all the ſand-holes and irregularities on the face of the metal are ground off, and the whole ſurface is ſmooth and regularly figured, the ſpeculum is then ready for the braſs grinder, and muſt be laid aſide for the preſent.

199 Manner of forming the braſs grinding-tool.

The braſs grinding-tool is formed in the following manner. Procure a round ſtout piece of Hamburgh braſs, at moſt a ſixth part larger than the metal to be poliſhed; and let it be well hammered, by the aſſiſtance of the gauge, into a degree of convexity ſuitable to the intended ſpeculum. Having done this, ſcrape and clean the concave ſide ſo thoroughly, that it may be well tinned all over; than caſt upon it, after it has been preſſed a proper depth into the ſand, the compoſition of tin and lead above-mentioned, in ſuch quantity, that it may, for a ſpeculum of four inches diameter, be at leaſt an inch and half thick, and with a baſe conſiderably broader than the top, in order that it may ſtand firmly upon the bench hereafter to be deſcribed. This being done, it muſt be fixed and turned in the lathe with great care, and of ſuch a convexity as exactly to ſuit the concave gauge. More care will be neceſſary in forming this tool than the former, eſpecially that no rings be left in turning; nor will the ſucceeding hone-tool require ſo much exactneſs, as any defects in turning will, by a method hereafter mentioned, be eaſily removed; but any inequality or want of truth in the braſs tool will occaſion a great deal of truble before it can be ground out by the emery. This tool muſt have a hole, ſomewhat leſs than that in the metal to be worked upon it, in the middle, quite through to the bottom. When this tool is finiſhed off in the lathe, its diameter ſhould be one-eighth wider than the metal.

200 How to form the bed of hones.

The hones ſhould be of the beſt ſort of thoſe recommended by Dr Smith. They ſhould be cemented in ſmall pieces (in a kind of pavement, as hath been already mentioned) upon a thick round piece of marble, or metal made of lead and tin in the proportions above directed, in ſuch a manner, that the lines between the ſtones may run ſtraight from one end to the other; ſo that placing the teeth of a fine ſaw in each of theſe diviſions, they may be cleared from one end to the other of the cement which riſes between the ſtones. This bed of hones ſhould be at leaſt one-fourth larger than the metal which is to be ground upon it; but there is no neceſſity for turning the metal on which the hones are cemented to the ſame convexity with the gauge. As ſoon as the hones are cemented down, and the joints cleared by the ſaw, this tool muſt be fixed in the lathe, and turned as exactly true to the gauge as poſſible; which done, it muſt be laid aſide for the preſent. The next tool to be made is the bruiſer.

201 Manner of forming the bruiſer.

The bruiſer ſhould be made of thick ſtout braſs like the former, perfectly ſound, about a quarter of an inch thick, and hammered as near to the gauge as poſſible. It ſhould then be ſcraped, cleaned, and tinned on the convex ſide, as the former tool was on the concave, and the ſame thickneſs of lead and tin caſt upon it. The general ſhape of this ſhould differ from the former; for as that increaſed in diameter at the bottom for the ſake of ſtanding firmly, ſo this ſhould be only as broad at bottom as at top, as it is to be uſed occaſionally in both thoſe poſitions. When this tool is fixed in the lathe, and turned off concave to the convex gauge with great truth likewiſe, its diameter ought to be the middle ſize between the hones and the poliſher.

Having with the lathe roughly formed the convex braſs grinder, the bed of hones, and the concave bruiſers, the convex and concave braſs tools and the metal muſt be wrought alternately and reciprocally upon each other with fine emery and water, ſo as to keep them as nearely to the ſame figure as poſſible; in order to which, ſome waſhed emery muſt be procured. This is beſt done by putting it into a vial, which muſt be half filled with water and well ſhaken up, ſo that, as it ſubſides, the coarſeſt may fall to the bottom firſt, and the fineſt remain at the top; and whenever freſh emery is laid upon the tools, the beſt method (which we ſhould alſo obſerve with the putty in poliſhing) will be, to ſhake gently the bottle, and pour out a ſmall quantity of the turbid mixture.

202 Of grinding the ſpeculum, the braſs tool, and the bruiſer, together.

The tools being now all ready, upon a firm poſt in the middle of a room, you are to begin to grind the braſs convex tool with the bruiſer upon it, working the latter croſſwiſe, with ſtrokes ſometimes acroſs its diameter, at others a little to the right and left, and always ſo ſhort, that the bruiſers may not paſs above half an inch within the ſurface of the braſs tool either way, ſhifting the bruiſer round its axis every half dozen ſtrokes or thereabout. You muſt likewiſe, every now and then, ſhift your own poſition, by walking round, and working at different ſides of the braſs tool: at times the ſtroke ſhould be carried round and round, but not much over the tool: in ſhort, they muſt be directed in ſuch a manner, and with ſuch equability, that every part of both tools may wear equally. This habit of grinding, as well as the future one of poliſhing, will ſoon be aquired. When you have wrought in this manner about a quarter of an hour with the bruiſer upon the tool, it will be then neceſſary to change them, and, placing the bruiſer upon its bottom, to work the convex tool upon that in the ſame manner.

When, by working in this equable manner alternately with the bruiſer and tool, and occaſionally adding freſh emery, you have nearly got out all the veſtiges of the turning tool, and brought them both nearly to a figure, it will then be time to give the ſame form to the metal. This muſt be done by now and then grinding it upon the braſs tool with the ſame kind of emery; taking care, however, by working the two former tools frequently together, to keep all three exactly in the ſame curve. The beſt kind of handle for the metal is made of lead, a little more than double its thickneſs, and ſomewhat leſs in diameter, of about three pounds weight, with a hole in the middle, (for reaſons to be afterwards ſhown), a little larger than that in the metal: this handle ſhould be cemented on with pitch. The upper edge of this weight ſhould be rounded off, that the fingers may not be hurt; and a groove about the bigneſs of a little finger be turned round juſt below it, for the more conveniently holding and taking the metal off the tools.

203 Manner of figuring the metal upon the hones.

When the bruiſer, braſs tool, and metal, are all brought to the ſame figure, and have all a true good ſurface, the next part of the proceſs is to give a correct ſpherical figure and a fine face to the metal upon the hones. It is neceſſary to obſerve, however, that the hones ſhould be placed in a veſſel of water, with which they ſhould be quite covered for at leaſt an hour before they are uſed; otherwiſe they will be continually altering their figure when the metal comes to be ground upon them. The ſame precaution is alſo neceſſary if you are called off from the work while you are grinding the metal; for, if they be ſuffered to grow dry, the ſame inconvenience will enſue.

In order to give a proper figure to the hones, and exactly ſuitable to that of the braſs tool, bruiſer, and metal, when the hones are fixed down to the block, ſome common flour emery (unwaſhed), with a good deal of water, muſt be put upon them, and the bruiſer being placed upon the hones and rubbed thereon with a few ſtrokes and a light hand, the inequalities of the ſtone will be quickly worn off; but, as a great deal of mud will be ſuddenly generated, it muſt be waſhed off every quarter of a minute with plenty of water. By a repetition of this two or three times, the hones (being of a very ſoft and friable nature) will be cut down to the figure without wearing or altering the bruiſer at all. Tho' this buſineſs may be quickly done, and can be continued but for a few ſtrokes at a time, it is abſolutely neceſſary that thoſe ſtrokes be carried in the ſame direction, and with the ſame care, which was obſerved in grinding the former tools together.

As ſoon as the hones have received the general figure of the bruiſer, and all the turning ſtrokes are worn out from them, the emery muſt be carefully waſhed off; in order to which, it will be neceſſary to clear it from the joints with a bruſh, under a ſtream of water. The bruiſer and metal muſt likewiſe be cleared in the ſame manner, and with equal care, from any lurking particles of emery.

The hones being fixed down upon the block, you now begin to work the bruiſer upon them with very cautious, regular, ſhort ſtrokes, forward and backward, to the right and left, turning the axis of the bruiſer in the hand, while you move round the hones by ſhifting your poſition, and walking round the block. The whole now depends upon a knack in working, which ſhould be conducted nearly in the following manner. Having placed the bruiſer on the centre of the hones, ſlide it in an equable manner forward and backward, with a ſtroke or two directly acroſs the diameter, a little on one ſide, and ſo on the other. Then, ſhifting your poſition an eighth part round the block, and having turned the bruiſer in your hand about as much, give it a ſtroke or two round and round, but not far over the edges of the hones, and then repeat the croſs-ſtrokes as before: thoſe round ſtrokes, which ought not to be above two or three at moſt, are given every time you ſhift your own poſition and that of the metals previous to the croſs ones, in order to take out any ſtripes, either in the hones or bruiſer, which may be ſuppoſed to be occaſioned by the ſtraight croſs ſtrokes. During the time of working, no mud muſt be ſuffered to collect upon the hones, ſo as to deſtroy the perfect contact between the two tools; and therefore they muſt every now and then be waſhed clean by throwing ſome water upon them. When, by working in this manner, all the emery ſtrokes are ground off from the bruiſer, and it has acquired a good figure and clean ſurface, you may then begin with the metal upon the hones, in the ſame cautious manner, waſhing off the mud as faſt as it collects; though that will be much leſs now than when the bruiſer was ground upon them. Every now and then, however, the bruiſer muſt be rubbed gently and lightly upon the hones, which will, as it were, by ſharpening them, and preventing too great ſmoothneſs, occaſion them to cut the metal faſter.

After having, by working in this manner, taken out all the emery ſtrokes, and given a fine face and true figure to the metal, which will be pretty well known by the great equality there is in the feel while you are working, and by which an experienced workman will form a pretty certain judgement, you may then try your metal, and judge of its figure by the following more certain method.

Waſh the hone pavement quite clean; then put the metal upon the centre of it, and give two or three ſtrokes round and round only, not carrying, however, the edges of the metal much over the hones; this will take out the order of ſtraight ſtrokes: then, having again waſhed the hones, and placed the ſpeculum upon their centre, with gentle preſſure, ſlide it towards you, till its edge be brought a little over that of the hones; then carry it quite acroſs the diameter as far on the other ſide, and having given the metal a light ſtroke or two in this direction, take it off the tool. The metal being wiped quite dry, place it upon a table at a little diſtance from a window; ſtand yourſelf as near the window, at ſome diſtance from the metal, and looking obliquely on its ſurface, turn it round its axis, and you will ſee at every half turn the grain given by the laſt croſs ſtrokes flaſh upon your eye at once over the whole ſurface of the metal. This, ſays Mr Mudge, is as certain a proof of a true ſpherical figure, as the operoſe and difficult method deſcribed by Dr Smith: for as there is nothing ſoft or elaſtic either in the metal, or in the hones, this glare is a certain proof of a perfect contact in every part of the two ſurfaces; which there could not be, if the ſpheres were not both perfect and preciſely the ſame. Indeed there is one accidental circumſtance which affords its aid in this and other ſimilar caſes; namely, that a concave and convex ſurface ground together, though ever ſo irregular at firſt, (will, if the working be uniform and proper, conſiſting, eſpecially at laſt, of croſs ſtrokes in every poſſible direction acroſs the diameter) be formed into portions of true and equal ſpheres. Had it not been for this lucky neceſſity, it would have been impoſſible to have produced that correctneſs which is eſſential in the ſpeculum of a good reflecting teleſcope by any mechanical contrivance whatever. For when it is conſidered, that the errors in reflection are four times as great as in refraction, and that the leaſt defect in figure is magnified by the powers of the inſtrument, any thing ſhort of perfection in the figure of the ſpeculum would be evidently perceived by the want of diſtinctneſs in the performance.

Here, however, Mr Mudge obſerves, that he all along ſuppoſes, both in forming the tools, and at laſt in figuring the metal (and the ſame is to be obſerved in the future proceſs of poliſhing), that no kind of preſſure is uſed that may endanger the bending or irregularly grinding them: they ſhould therefore be held with a light hand, and looſely between the fingers; and the motion given ſhould be in a horizontal direction, with no other preſſure than their own dead weight.

Having now finiſhed the metal on the hones, and rendered it both in point of figure and ſurface fit for the laſt and moſt eſſential part of the proceſs, viz. that of poliſhing, we ſhall now proceed to deſcribe it as minutely as poſſible, though many little circumſtances muſt neceſſarily be omitted, and can only be ſupplied by experience.

404
Of the poliſhing tools.

The poliſhing of the ſpeculum is the moſt difficult and eſſential part of the proceſs; and every experienced workman knows, to his vexation, that the moſt trifling error here will be ſufficient to ſpoil the figure of his metal, and render all his preceding caution uſeleſs. On this occaſion alſo Mr Mudge makes the following remarks on the method of poliſhing uſed by Hadley and Molyneux, and already deſcribed from Dr Smith's Optics. "Firſt then, ſays he, the tool itſelf uſed by them in poliſhing the metal is formed with infinite difficulty. The firſt deſcribed poliſher is directed to be made by covering the tool with ſarcenet, which is to be ſaturated with a ſolution of pitch in ſpirit of wine, by ſucceſſive applications of it with a bruſh, till it is covered, and by the evaporation of the ſpirit of wine filled with this extract of pitch; the ſurface is then to be worked down and finiſhed with the bruiſer. This is all very eaſy in imagination; but whoever has uſed this method (which I have myſelf, unſucceſsfully, ſeveral times) muſt have found it attended with infinite labour, and at laſt the buſineſs done in a very unſatisfactory manner; for the pitch by this proceſs will be deprived of an eſſential part of its compoſition. The ſpirit of wine diſſolves none but the reſinous parts of its ſubſtance, which is hard and untractable; and if you uſe ſoap or ſpirit of wine to ſoften or diſſolve it, it will equally affect the whole ſurface, the lower as well as the higher parts of it. And ſuppoſe that, with infinite labour with the bruiſer, it is at laſt reduced to a fine uniform ſurface, it is nevertheleſs too hard ever to give a good poliſh with that luſtre which is always ſeen in good metals. Nor will it give a good ſpherical figure: for a perfect ſphere is formed, as I obſerved before, by that intimate accommodation ariſing from the wear and yielding of both tool and metal; whereas, in this method there is ſuch a ſtubbornneſs in the poliſher, that the figure of the metal, whether good or bad, muſt depend upon the truth of the former, which is very ſeldom perfect.

"If the poliſher be made in the ſecond manner propoſed, viz. by ſtraining the pitch through an outer covering, which is afterwards to be ſtripped off, the ſuperficies of pitch and ſarcenet is ſo very thin, that the putty working into them forms a ſurface hard and untractable, ſo that it is impoſſible to give the ſpeculum a fine poliſh. Accordingly all thoſe metals which are wrought in this way have an order of ſcratches inſtead of poliſh, diſcovering itſelf by a greyiſh viſible ſurface. Beſides, ſuppoſing this tool perfectly finiſhed, and anſwering its purpoſe ever ſo well, it is impoſſible that it can produce in the ſpeculum any other than a ſpherical figure; and indeed nothing elſe is expected from this method, as is evident from the experiment recommended to aſcertain the truth of it. You are directed to place a ſmall luminous object in the centre of the ſphere of which the metal is a ſegment; and then having adjuſted an eye-glaſs at the diſtance of its own focal length from the object, and ſo ſituated that the image of the object formed by the ſpeculum may be viſible to the eye, you are to judge of the perfect figure of the metal by the ſharpneſs and diſtinctneſs with which the image appears. From hence it is very evident, that as the object and image are both diſtant from the metal by exactly its radius, nothing but a true ſpherical figure of the ſpeculum can produce a ſharp and diſtinct image; and that the image could not be diſtinct if the figure of the ſpeculum were parabolic. Conſequently, if the ſame ſpeculum uſed in a teleſcope were to receive parallel rays, there would neceſſarily be a conſiderable aberration produced, and a conſequent imperfection in the image. Accordingly, there never was a good teleſcope made in this manner; for if the number of degrees, or the portion of the ſphere of which the great metal is a part, were as conſiderable as it ought to be, the inſtrument would bear but a very low charge, unleſs a great part of the circumference of the metal were cut off by an aperture, and the ill effects of the aberration by that means in ſome meaſure prevented.

"If ever a finiſhed metal turned out without this defect, and has been found perfectly ſharp and diſtinct, it muſt have been owing to an accidental parabolic tendency, noways the natural reſult of the proceſs, and therefore quite unexpected, and moſt probably unknown to the workman."

Our author next acquaints us, that, from obſerving the high poliſh of ſome of the metals made by Mr Short, and concluding that the high luſtre of the poliſh could never have been produced in the manner above deſcribed, but by ſome more ſoft and tender ſubſtance, he was directed to make uſe of pitch itſelf, eſpecially as Sir Iſaac Newton mentions his having uſed that ſubſtance in his operations. Accordingly, ſhortening Dr Smith's proceſs, he made a ſet of tools in the manner above-mentioned, except that he was obliged to make ſome ſubſequent alteration in the poliſher. Having given a good ſpherical figure to the braſs tool and the bruiſer, and likewiſe to the metal upon the hones, and made the braſs convex tool ſo hot as juſt not to hurt the finger, he tied a lump of common pitch, which ſhould neither be too hard nor too ſoft, in a rag, and holding it in a pair of tongs over a ſtill fire where there was no riſing duſt, till it was ready to ſtrain through the linen, he cauſed it to drop on the ſeveral parts of the convex tool, till he ſuppoſed it would cover the whole ſurface to about twice the thickneſs of a ſhilling; then ſpreading the pitch as equally as he could, he ſuffered the *poliſher* (the name he gives to the tool ſo prepared) to grow quite cold. He then made the bruiſer ſo hot as almoſt to burn his fingers; and having fixed it to the bench with its face upwards, he ſuddenly placed the poliſher upon it, and quickly ſlid it off; by this means rendering the ſurface of the pitch ſomewhat more equal. The pitch is then to be wiped off from the bruiſer with a little tow; and by touching the ſurface with a tallow candle, and wiping it a ſecond time, it will then be perfectly clean, and fit for a ſecond proceſs of the ſame ſort, which muſt again be performed as quickly as poſſible; and this is ordinarily ſufficient to give a general figure to the ſurface of the pitch. The bruiſer and the poliſher are then ſuffered to grow perfectly cold; when the pitch, conſidering what has been taken off, will be about the thickneſs of a ſhilling.

Here, however, it is neceſſary to obſerve, that the pitch ſhould neither be very hard and reſinous, nor too ſoft: if the former, it will be ſo untractable as not to work kindly; and if too ſoft, it will in working alter its figure faſter than the metal, and too readily fit itſelf to the irregularity of its figure, if it have any. When both tools are perfectly cold, he gave the poliſher a gentle warmth, and then fixed the bruiſer to the block with its face upwards; and (having, with a large camel's-hair bruſh, ſpread over the face of the poliſher a little water and ſoap to prevent ſticking, with ſhort, ſtraight, and round ſtrokes, he worked it upon the bruiſer, every now and then adding a little more water and ſoap, till the pitch upon the poliſher had a fine ſurface and the true form of the bruiſer; and this he continued till they both grew perfectly cold together: in this manner the poliſher was formed in about a quarter of an hour. But here a difficulty aroſe. For when he began to poliſh the metal, he found that the edge of the hole in the ſpeculum collected the pitch towards the middle of the poliſher: hence, though in this method of working he could give an exquiſite poliſh, as the putty lodged itſelf in the pitch exceedingly well, yet the figure of the mëtal was injured in the middle; nor indeed did the work go on with that equability which is the inſeparable attendant on a good figure. In order to obviate this difficulty, he caſt ſome metals with a continued face, the holes not going quite through, within perhaps the thickneſs of a ſixpence. In this way he finiſhed two or three metals, and the work went on very well; but when he came to open the holes, even though the utmoſt caution was uſed, the metals were found to be imperfect. This he attributed to an alteration of the figure from the removal of even that ſmall portion of metal after the ſpeculum had been finiſhed. This he ſuppoſes to have been the cauſe of his ſpoiling a very diſtinct and perfect two-foot metal, which bore a charge of 200 times, only by opening the ſharp part of the edge of the hole, becauſe he thought that it bounded the field: ſo eſſentially neceſſary is an exquiſite correctneſs of figure in the ſpeculum of a perfect reflector.

This experiment not ſucceeding, inſtead of caſting the metal without a hole, he made one quite through the middle of the poliſher, a little leſs than that in the ſpeculum. This perfectly anſwered the purpoſe; no more inconvenience aroſe from the gathering of the pitch, for it had now no greater tendency to collect at the centre than the ſides; and thus he finiſhed ſeveral metals ſucceſſively, excellent both in figure and poliſh. One of theſe, of 2 inches diameter and 7.5 focal length, bore a charge of 60 times and upwards.

In this method of working, the poliſhing goes on in an agreeable, uniform, and ſmooth manner; and the ſmall degree of yielding in the pitch, which is actually not more than the wearing of the metal, produces that mutual accommodation of ſurfaces ſo neceſſary to a true figure. In the beginning of the poliſh, and indeed for ſome time during the progreſs of it, (always remembering now and then to move the metal round its axis), he worked round and round, not far from, and always equally diſtant from, the centre; except that every time, previous to the ſhifting the metal on its axis, he uſed a croſs ſtroke or two; and when the poliſh was nearly completed, he uſed moſtly croſs ſtrokes, giving a round ſtroke or two likewiſe every time he turned the metal on its axis. In this method of working, he always obſerved that the metal poliſhed faſteſt in the middle; inſomuch that one half or two thirds of it would be completely poliſhed, when the circumference was ſcarcely touched by the tool. Obſerving this in ſome of the firſt metals, and not conſidering that this way of poliſhing was in fact a ſpecies of grinding, and as perfect as that upon the hones, he went on reluctantly with the work, almoſt deſpairing of being able to produce a good figure. However, he was always agreeably diſappointed; for when the poliſh was extended to the edge, or within a tenth of an inch of it, he almoſt conſtantly found the figure good, and the performance of the metal very diſtinct. But this ſame circumſtance of apparent defect in the metals, was in fact that to which their perfection was owing; for they all, contrary to his expectation, turned out parabolic. On the other hand, when he chanced to find that a metal, when firſt applied to the poliſher, took the poliſh equally all over, and conſequently the buſineſs did not take up above 10 minutes; yet the metal conſtantly turned out good for nothing. From frequent obſervations, however, he at laſt found a method of giving a correct parabolic figure and an exquiſite poliſh at the ſame time.

205 How to poliſh the ſpeculum.

In poliſhing the ſpeculum, in order to avoid the intruſion of any particles of emery, it would not be right to poliſh in the ſame room where the metal and tools were ground, nor in the ſame cloths which were worn in the former proceſs; at leaſt it would be neceſſary to keep the bench quite wet, to prevent any duſt from riſing.

Having then made the poliſher, by coating the braſs convex tool equally with pitch, which we ſuppoſe ſmoothed and finiſhed with the braſs tool in the manner before deſcribed, and which is a very eaſy proceſs, the whole operation is begun and finiſhed in the following manner.

The leaden weight, or handle, upon the back of the metal, ſhould be divided into eight parts, by ſo many deep ſtrokes of a graver upon the upper ſurface of the lead, marking each ſtroke with the numbers 1, 2, 3, 4, and ſo on, that the turns of the metal in the hand may be known to be uniform and regular.

To prevent any miſchief from coarſe particles of putty, it muſt be waſhed immediately before uſing. In order to this, put about half an ounce of putty into an ounce phial, and fill it two-thirds with water; then having ſhaken the whole, let the putty ſubſide, and ſtop the bottle with a cork.

In a tea-cup with a little water, there ſhould be a full-ſized camel's-hair bruſh, and a piece of dry clean ſoap in a galley-pot: a ſoft piece of ſponge will alſo be neceſſary. Theſe, as well as the metal bruiſer and poliſher, ſhould be conſtantly covered from duſt.

The poliſher being fixed down, and the camel's-hair bruſh being firſt wetted and rubbed a little over the ſoap, let every part of the tool be bruſhed over therewith; then work the bruiſer with ſhort, ſtraight, and round ſtrokes, lightly upon the tool, and continue to do ſo, now and then turning it, till the poliſher have a good face, and be fit for the metal. Then having ſhaken up the putty in the phial, and touched the poliſher in five or ſix places with the cork wetted with that and the water, place the bruiſer upon the tool, and give a few ſtrokes upon the putty to rub down any gritty particles; after which, having removed it, work the metal lightly upon the poliſher round and round, carrying the edges of the ſpeculum, however, not quite half an inch over the edge of the tool, and now and then with a croſs ſtroke.

The firſt putty, and indeed all the ſucceeding applications of it, ſhould be wrought with a conſiderable while: for if time be not given for the putty to bed itſelf in the pitch, and any quantity of it lie looſe upon the poliſher, it will accumulate into knobs, which will injure the figure of the metal; and therefore as often as ever ſuch knobs ariſe, they muſt be carefully ſcraped off with the point of a penknife, and the looſe ſtuff taken away with the bruſh. After the putty is well wrought into the pitch, ſome more may be added in the ſame manner, but never much at a time; and always remembering to work upon it firſt with the bruiſer, for fear any gritty particles may find their way upon the poliſher. If the bruiſer be apt to ſtick, and do not ſlide ſmoothly upon the pitch, the ſurface of either tool may be occaſionally bruſhed over with the ſoap and water, but it muſt be remembered that the wet bruſh muſt be but lightly rubbed upon the ſoap.

In the beginning of this proceſs little effect is produced, and the metal does not ſeem to poliſh faſt, in ſome meaſure owing to its taking the poliſh in the middle, and perhaps becauſe neither that nor the bruiſer move evenly upon the poliſher: but a little perſeverance will bring the whole into a good temper of working; and, when the pitch is well defended by the coating of the putty, the proceſs will advance apace, and the former acquiring poſſibly ſome little warmth, the metal moves more agreeably over it, with an uniform and regular friction. All this while the metal muſt have no more preſſure than that which it derives from its own weight and that of the handle; and the poliſher muſt never be ſuffered to grow dry, but, as often as it has any tendency to do ſo, the edges of it muſt be moiſtened with the hair-pencil; and now and then, even when freſh putty is not laid on, the ſurface of the poliſher ſhould be touched with the bruſh to keep it moiſt.

When the poliſh of the metal nearly reaches the edge (for it always, as we ſaid before, begins in the middle) you muſt alter your method of working; for now the round ſtrokes muſt be gradually altered for the ſhort and ſtraight ones. Suppoſing then you are juſt beginning to alter them; after having put on freſh putty, and gently rubbed it with two or three ſtrokes of the bruiſer, you place the metal on the tool, and after a ſtroke or two round and round, give it a few forward and backward, and from ſide to ſide, but with the edges very little over the tool; then having turned the metal one-eighth round in your hand, and having moved yourſelf as much round the block (which muſt be remembered throughout the whole proceſs) you go on again with a ſtroke or two round, to lead you only to the croſs ſtrokes, which are now to be principally uſed, and with more boldneſs. After this has been done ſome time, the metal will begin to move ſtifly as the friction now increaſes, and the ſpeculum poliſhes very beautifully and faſt; and the whole ſurface of the poliſhing tool will be equally covered with a fine metallic bronze. The tool, even now, muſt not be ſuffered to become dry; a ſingle round ſtroke in each of your ſtations and turnings of the metal will be ſufficient, and the reſt muſt all be croſs ones, for we are completing a circular figure. You muſt now be very diligent; for the poliſher drying, and the friction increaſing very faſt, the buſineſs of the ſpherical figure is nearly at an end. As the metal wears much, its ſurface muſt be now and then cleaned, with a piece of ſhammy leather, from the black ſtuff which collects upon it; and the poliſher likewiſe from the ſame matter, with a ſoft piece of wet ſponge. You will now be able to judge of the perfect ſpherical figure of the metal and tool, when there is a perfect correſpondence between the ſurfaces, by the fine equable feel there is in working, which is totally free from all jerks and inequalities. Having proceeded thus far, you may put the laſt finiſhing to this figure of the metal by bold croſs ſtrokes, only three or four in the directions of each of the eight diameters, turning the metal at the ſame time: this muſt be done quickly; for it ought, in this part of the proceſs particularly, to be remembered, that, if you permit the tool to grow quite dry, you will never be able, with all your force, to ſeparate that and the metal, without deſtroying the poliſher by heat.

The metal has now a beautiful poliſh and a true ſpherical figure, but will by no means make a ſharp diſtinct image in the teleſcope: for the ſpeculum (if it be tried in the manner hereafter recommended) will not be found to make parallel rays converge without great aberration; indeed the deviation will be ſo great, as to be very ſenſibly perceived by a great indiſtinctneſs in the image.

206 How to give the parabolic figure to the metal.

In order then to give the ſpeculum the laſt and finiſhing figure, which is done by a few ſtrokes, it muſt be particularly remarked, that by working the metal round and round, the ſphere of the poliſher by this means growing leſs, it wears faſteſt in the middle: and as a ſegment of a ſphere may become parabolic, by opening the extremes gradually from within outwards, ſo it may be equally well done by increaſing the curvature in the middle, in a certain ratio, from without inwards.

Suppoſing then the metal to be now truly ſpherical, ſtop the hole in the poliſher, by forcing a cork into it underneath, about an inch, ſo that it do not reach quite to the ſurface; and having waſhed off any mud that may be on the ſurface of the tool with a wet ſoft piece of ſponge, whilſt the ſurface of it is a little moiſt, place the centre of the metal upon the middle of the poliſher; then having, with the wet bruſh, lodged as much water round the edge of the metal as the projecting edge will hold, fill the hole of the metal and its handle with water, to prevent the evaporation of the moiſture, and the conſequent adheſion between the ſpeculum and poliſher, and let the whole reſt in this ſtate two or three hours: this will produce an intimate contact between the two, and by parting with any degree of warmth they may have acquired by the vicinity of the operator, they will grow perfectly cold together.

By this time you may puſh out the cork from the poliſher, to diſcharge the water, and give the metal the parabolic figure in the following manner.

Move the metal, gently and ſlowly at firſt, a very little round the centre of the poliſher (indeed after this reſt it will move ſtifly); then increaſing by degrees the diameter of theſe ſtrokes, and turning the metal frequently round its axis, give it a larger circular motion, and this without any preſſure but its own weight, and holding it looſely between the fingers: this manner of working may ſafely be continued about two minutes, moving yourſelf as uſual round the block, and carrying the round ſtrokes in their increaſed and largeſt ſtate, not more than will move the edge of the metal half an inch or five-eighths over the tool. The ſpeculum muſt not all this while be taken off from the poliſher; and conſequently no freſh putty can be added. It will not be ſafe to continue this motion longer than the time above-mentioned; for if the parabolic tendency be carried the leaſt too far, it will be impoſſible to recover a true figure of that kind but by going through the whole proceſs for the ſpherical one in the manner before deſcribed, by the croſs ſtrokes upon the poliſher, which takes a great deal of time. However, when there is occaſion, it may be done; and Mr Mudge has ſeveral times recovered the circular figure when he had inadvertently gone too far with the parabolic, and ultimately finiſhed the metal on the poliſher without the uſe of the hones.

207
To try the true figure of the metal.

It will now be proper to try the figure of the ſpeculum; and that is always beſt done by placing it in the teleſcope it is intended for. In order to this, Mr Mudge uſes the inſtrument as a kind of microſcope; placing the object, however, at ſuch a diſtance that the rays may be nearly parallel. At about 20 yards, a watch-paper, or ſome ſuch object, on which there are ſome very fine hair-ſtrokes of a graver, is fixed up. The lead muſt then be taken off from the back of the ſpeculum; which is beſt done by placing the edge of a knife at the junction of the lead and metal, when, by ſtriking the back of it with a ſlight blow, the pitch immediately ſeparates, and the handle drops off; the remaining pitch may be ſcraped off with a knife, taking care that none of the duſt ſtick to the poliſhed face of the metal.

Having placed the ſpeculum in the cell of the tube, and directed the inſtrument to the object, make an annular kind of diaphragm with card-paper, ſo as to cover a circular portion of the middle part of the metal between the hole and the circumference, equal in breadth to about an eighth part of the diameter of the ſpeculum: this paper ring ſhould be fixed in the mouth of the teleſcope, and remain ſo during the whole experiment; for the part of the metal covered by it is ſuppoſed to be perfect, and therefore unemployed.

There muſt likewiſe be two other circular pieces of card-paper cut out, of ſuch ſizes, that one may cover the centre of the metal by completely filling the hole in the laſt deſcribed annular piece; and the other, ſuch a round piece as ſhall exactly fit into the tube, and ſo broad as that the inner edge may juſt touch the outward circumference of the middle annular piece. It would be convenient to have theſe two laſt pieces ſo fixed to an axis that they may be put in their places, or removed from thence, ſo eaſily, as not to diſplace or ſhake the inſtrument. All theſe pieces therefore together will completely ſhut up the mouth of the teleſcope.

Let the round piece which covers the centre of the metal, or that which has no hole in it, be removed; and, by a nice adjuſtment of the ſcrew, let the image (which is now formed by the centre of the mirror) be made as ſharp and diſtinct as poſſible. This being done, every thing elſe remaining at reſt, replace the central piece, and remove the outſide annular one, by which means the circumference only of the ſpeculum will be expoſed, and the image now formed will be from the rays reflected from the outſide of the metal. If there be no occaſion to move the ſcrew and the little metal, and the two images formed by theſe two portions of the metal be perfectly ſharp and equally diſtinct, the ſpeculum is perfect, and of the true parabolic curve; or at leaſt the errors of the great and little ſpeculum, if there be any, are corrected by each other.

If, on the contrary, under the laſt circumſtance, the image from the outſide of the metal ſhould not be diſtinct, and it ſhould become neceſſary, in order to make it ſo, that the little ſpeculum be brought nearer, it is plain that the metal is not yet brought to the parabolic figure; but if, on the other hand, in order to procure diſtinctneſs, you be obliged to move the little ſpeculum farther off, then the figure of the great ſpeculum has been carried beyond the parabolic, and hath aſſumed an hyperbolic form. When the latter is the caſe, the circular figure of the metal muſt be recovered (after having fixed on the handle with ſoft pitch) by bold croſs ſtrokes upon the poliſher, finiſhing it again in the manner above deſcribed. If the ſpeculum be not yet brought to the parabolic form, it muſt cautiouſly have a few more round ſtrokes upon the poliſher; indeed a very few of them in the manner before deſcribed make in effect a greater difference in the ſpeculum than would be at firſt imagined. If a metal of a true ſpherical figure were to be tried in the above-mentioned manner in the teleſcope (which Mr Mudge has frequently done) the difference of the foci of the two ſegments of the metal would be ſo conſiderable, as to require two or three turns of the ſcrew to adjuſt them; ſo very great is the aberration of a ſpherical figure of the ſpeculum, and ſo improper to procure that ſharpneſs and preciſion ſo neceſſary to a good reflecting teleſcope.

This is by no means the caſe with the object-glaſſes of refractors; for beſides that they are in fact never ſo diſtinct as well-finiſhed reflectors, the apertures of them are ſo exceedingly ſmall, compared to the latter, and the number of degrees employed ſo very ſmall, that the inconvenience of a ſpherical figure is not ſo much perceived. Accordingly we obſerve in the generality of reflectors, (whoſe ſpecula, unleſs by accident, are always ſpherical), that the only true rays which form the diſtinct image ariſe from the middle of the metal: and unleſs the defect be remedied by a conſiderable aperture, which deſtroys much light, the falſe reflection from the inſide of the metal produces a greyiſh kind of hazineſs, which is never ſeen in Mr Short's, or indeed in any good teleſcopes.

Suppoſing that the two foci of the different parts of the metal perfectly coincide; and that, by the union of them when the apertures are removed, the teleſcope ſhews the objects very ſharp and diſtinct, you are not, however, even then to conclude that the inſtrument is not capable of farther improvement: for you will perceive a ſenſible difference in the ſharpneſs of the image, under different poſitions of the great ſpeculum with reſpect to the little one, by turning round the great metal in its cell, and oppoſing different parts of it to different parts of the little metal, correcting by this means the error of one by the other. This attempt ſhould be perſevered in for ſome time, turning round the great ſpeculum about one-ſixteenth at a time, and carefully obſerving the moſt diſtinct ſituation each time the eye-piece is ſcrewed on: when, by trying and turning the great metal all round, the diſtincteſt poſition is diſcovered, the upper part of the metal ſhould be marked with a black ſtroke, in order that it may always be lodged in the cell in the ſame poſition. This is the method Mr Short always uſed; and the caution is of ſo much conſequence, that he thought it neceſſary to mention it very particularly in his printed directions for the uſe of the inſtrument.

And, farther, Mr Short frequently corrected the errors of the great by the little metal in another way. If the great ſpeculum did not anſwer quite well in the te-

teleſcope, he cured that defect ſometimes by trying the effect of ſeveral metals ſucceſſively, by this means correcting the errors of one by the other; for in ſeveral of his teleſcopes which have paſſed thro' our author's hands, when the ſizes and powers have been the ſame, he has found that the great metals, tho' very diſtinct in their proper teleſcopes, yet have, when taken out and changed from one to the other, ſpoiled both teleſcopes, rendering them exceedingly indiſtinct, which could ariſe from no other circumſtance. For this reaſon he ſuppoſes it was, that Mr Short kept, ready furniſhed, a great many large metals of the ſame focal length, ſo that, when he wanted to mount a teleſcope, he might from a great choice be able to combine thoſe metals which ſuited each other beſt. Our author is ſtrongly inclined to believe this was the caſe, not only from the above obſervation, but becauſe he ſhewed him a box of finiſhed metals, in which he is ſure there were a dozen and a half of the ſame focal length.

To return: A little uſe in working will make the whole of the proceſs of grinding and poliſhing very eaſy and certain; for though we have endeavoured to be as particular as poſſible, it is yet ſcarcely poſſible to ſupply a want of dexterity, ariſing from habit only, by the moſt laboured and minute deſcription. And though the above account may appear irkſome to the reader, as it lies cold before the eye, it is hoped, whoever attempts to make the inſtrument, will not complain of it as tediouſly particular.

It may, however, be farther remarked, that when the metal begins to move ſtifly upon the poliſher, and particularly when the figure is almoſt brought to the parabolic form, it will be neceſſary to fix the elbows againſt the ſides, in order to give momentum and equability to the motion of the hand by that of the whole body.

The ſame poliſher will ſerve for ſeveral metals, if it be ſomewhat warmed when you begin to uſe it.

There is another circumſtance, and a material one too, which muſt not be omitted; it is this. For the very ſame reaſon that the pitch ſhould not be too hard or ſoft, the work will not proceed well in the heat of ſummer, or the cold of winter: in the latter, it may be poſſible to remedy the defect by having the room warmed with a ſtove; and in the ſummer, the other inconvenience may perhaps be avoided by uſing a harder kind of pitch; but our author much doubts in either caſe whether the work will go on ſo kindly: he has himſelf always wrought in ſpring and autumn.

The proceſs of poliſhing, and indeed grinding upon the hones, will not go on ſo well if it be not continued uninterruptedly from beginning to end: for if the work of either kind be left but for a quarter of an hour, and you then return to it again, it will be ſome time before the tool and metal can get into a kindly way of working; and till they do, you are hurting what was done before.

We have all along ſuppoſed that the metal we have been working was about four inches diameter: if it be either larger or ſmaller, the ſizes of the hones, bruiſer, and poliſher, muſt be proportionably different. Our author ſays he never found any ill conſequence ariſing from the different expanſion from heat and cold in any of the tools, though they be made of different metals and ſubſtances, unleſs the inconvenience, occaſioned by the interruption before hinted at, be thought to reſult from thence; for the alteration produced in the ſurface of the ſpeculum, both by grinding and poliſhing, is ſo much quicker than any that can be ſuppoſed to ariſe from the former cauſe, that it is never attended with any practical conſequence.

208 Teſt of the goodneſs of a teleſcope.

Magnifying very minute objects, and particularly reading at a diſtance, have been generally conſidered as the ſureſt teſt of the goodneſs of a teleſcope; and indeed, when the page is placed at a great diſtance, ſo that the letters ſubtend but a very ſmall angle at the eye, if then they appear with great preciſion and ſharpneſs, it is moſt probable that the inſtrument is a good one. But we are, nevertheleſs, ſometimes apt to be deceived by this method; nor is it always poſſible to determine upon the different merits of two inſtruments of equal power, by this mode of examination; for when the letters are removed to the utmoſt extent of the powers of the two inſtruments, the eye is apt to be prejudiced by the imagination. If two or three words can be here and there made out, all the reſt are gueſſed at by the ſenſe; inſomuch that an obſerver, zealous for the honour of his inſtrument, is very apt to deceive himſelf in ſpite of his intentions. The ſurer teſt is by figures, where you can procure no aid from this ſort of deception. In order to examine reflecting teleſcopes, our author made upon a piece of copper, and on a black ground, ſix lines conſiſting of about 12 pieces of gold figures, and each line of figures differing in magnitude; from the ſmalleſt that could be diſtinctly made, to thoſe of about two-tenths of an inch long: moreover, the figures in the ſeveral lines were differently diſpoſed, and the ſum of each line alſo differed. It is evident that by this method all gueſs is precluded; and that of two inſtruments, of the ſame powers, that which can make out the leaſt order of figures, which will be known by the ſum, is the beſt teleſcope. Such a plate he cauſed to be fixed up for experiments againſt the top of a ſteeple, about 300 yards north of his houſe; and it will ſerve to give ſome idea of the diſtinctneſs with which very ſmall figures could be made out at that diſtance, by ſaying, that in a clear ſtate of the air, and with the ſun behind him, with a teleſcope of 18 inches focal length, which count Bruhl did him the honour to accept, and now has in his poſſeſſion, he has ſeen the legs of a ſmall fly, and the ſhadows of them, with great preciſion and exactneſs.

"I cannot conclude, (ſays our author,) without indulging myſelf in an obſervation on the amazing ſagacity of Sir Iſaac Newton in every ſubject upon which he thought fit to employ his attention. It was he who firſt propoſed, and indeed practiſed, the poliſhing with pitch: a ſubſtance, which at firſt ſight, perhaps, every one but himſelf would have thought very improper, from its ſoftneſs, to produce that correctneſs of figure ſo neceſſary upon theſe occaſions; and yet I do believe, that it is the only ſubſtance in nature that is perfectly calculated for the purpoſe: for at the ſame time that it is ſoft enough to ſuffer the putty to lodge very freely on its ſurface, and for that reaſon to give a moſt tender and delicate poliſh; it is likewiſe totally inelaſtic, and therefore never, from that principle, ſuffers any alteration in the figure you give it. If the firſt makers of the inſtrument, therefore, had given proper credit to, or had ſimply followed the hint Sir Iſaac gave, it would have ſaved them infinite trouble, and they would have produced much better inſtruments; but the pretended refinement, of drawing a tincture from pitch with ſpirits of wine, affords you only the reſinous, hard, and untractable part of the pitch, diveſted of all that part of its original ſubſtance, which is neceſſary to give it that accommodating pliability in which its excellence conſiſts."

It is needleſs to ſwell this account with a detail of the proceſs for poliſhing the little ſpeculum, as it muſt be conducted in the ſame manner which has been already deſcribed in that of the large one: only obſerving, that as the little metal has an uninterrupted face, without a hole, ſo there is no occaſion for one in the poliſher; and likewiſe that, as a ſpherical figure is all that need here be practically attempted, ſo the difficulty in finiſhing is infinitely ſhort of that of the other.

209 Method of ſoldering a piece of braſs to the ſmall mirror.

As it is always neceſſary to ſolder to the back of the little ſpeculum a piece of braſs, as a fixture for the ſcrew to adjuſt its axis, Mr Mudge mentions a ſafe and neat method of doing it, which may be very uſeful to the optical or mathematical inſtrument-maker upon other occaſions. Having cleaned the parts to be ſoldered very well, cut out a piece of tin-foil the exact ſize of them; then dip a feather into a pretty ſtrong ſolution of *ſal ammoniac* in water, and rub it over the ſurfaces to be ſoldered; after which place the tin-foil between them as faſt as you can (for the air will quickly corrode their ſurfaces ſo as to prevent the ſolder taking), and give the whole a gradual and ſufficient heat to melt the tin. If the joints to be ſoldered have been made very flat, they will not be thicker than a hair: though the ſurfaces be ever ſo extenſive, the ſoldering may be conducted in the ſame manner; only care muſt be taken, by general preſſure, to keep them cloſe together. In this manner, for inſtance, a ſilver graduated plate may be ſoldered on to the braſs limb of a quadrant, ſo as not to be diſcernible by any thing but the different colour of the metals. This method was communicated to our author by the late Mr Jackſon, who during his life kept it a ſecret, as he uſed it in the conſtruction of his quadrants.

In Plate CCXXVIII. are figured the ſhape of the leaden tool for rough-grinding; the hones; and the apparatus to be applied in the mouth of the teleſcope, to aſcertain the true figure of the ſpeculum.

Fig. 7. The grinder for working off the rough face of the metal: the black ſtrokes repreſent deep grooves made with a graver.

Fig. 8. The bed of hones, which is to complete the ſpherical figure of the ſpeculum, and to render its ſurface fit for the poliſher.

Fig. 9. An apparatus for examining the parabolic figure of the ſpeculum.

AA, The mouth of the teleſcope, or edge of the great tube.

BB, A thin piece of wood faſtened into and fluſh with the end of the tube; to which is permanently fixed the annular piece of paſteboard CC, intended to cover and to prevent the action of the correſponding part of the ſpeculum.

D, Another piece of paſteboard, fixed by a pin to the piece of wood BB, on which it turns as on a centre; ſo that the great annular opening HH, may be ſhut up by the ring FF, or the aperture GG by the imperforate piece E, in ſuch manner, that in the firſt inſtance the reflection may be from the centre, and in the latter from the circumference, of the great ſpeculum.

§ 6. *Deſcription of the different parts of which Reflecting Teleſcopes are compoſed, and of fitting up an inſtrument of that kind; with the rectification of Teleſcopic ſights of Quadrants, &c.*

In Plate CCXXIX. all theſe are diſtinctly repreſented.

Fig. 1. ſhews the form of a pair of pincers neceſſary on ſeveral occaſions, particularly for breaking off the corners of a piece of glaſs, in order to make the eye-glaſſes.

Fig. 2. 3. Two wooden frames for confining the ſand in which the metalline ſpecula are to be caſt.

Fig. 6. 7. Two iron moulds in which are to be caſt two models of lead for the ſpecula. Theſe models are afterwards to be turned as exactly as poſſible to the gauges, and then uſed for giving the form neceſſary to the ſand in the frames.

Having caſt the ſpecula, and poliſhed them according to the directions already given, you muſt next provide a tube of plate braſs, well ſmoothed, for the body of your teleſcope; and whoſe length muſt be determined by the focal length of the large ſpeculum. This tube muſt be painted black on the inſide, in order to reflect as little extraneous light as poſſible. When the teleſcopes are ſmall, braſs is the uſual material of the tube; but when large, the expence will be leſſened by making them of wood. This tube muſt have a ſlit in one of its ſides, for allowing the ſmall mirror to ſlide up and down.

AB is a circle of braſs, to be ſoldered round the mouth of the tube CD, in order to keep on the cover. Of this cover EFHI ſhews one piece, which is another brazen circle fitting the one AB ſo cloſely that it cannot be taken off or put on without ſome difficulty. G is a ſolid plate, which being fitted to the middle vacancy of the former, completes the cover.

LM is another circle of the ſame materials which contains the large ſpeculum, and to which is ſoldered the piece NO, having a hole in it to receive the eye-piece of the teleſcope. *xyz*, Is a thin piece of copper, a little bent, on which the ſpeculum is laid, and which by its ſpring keeps it ſtiff in its place.

The eye-piece may be compoſed of two tubes RPQ and Y*d*Z, of which the latter ſlides upon the former. KZ is the extremity of the eye-piece; and hath a ſmall hemiſphere perforated, in order to admit the light to the eye. The various parts of this extremity are repreſented at *b*, *c*, and *v*, which will give a more perfect idea of it than any deſcription. In this eye-piece are placed the two lenſes which magnify the image from the mirrors, and which are kept in their proper places by the rings S, T, V, X.

The ſmall mirror is now to be fixed exactly in the middle of the tube, which is beſt done by ſuch a contrivance as is ſhewn at *g h i*, *k* and *n*. *f* is a ruler of braſs, which, ſliding along with the piece *g*, preſerves, by means of its croſs branches, the ſmall mirror from falling from ſide to ſide as the teleſcope happens to be turned. *l* is a round piece of braſs, faſtened on the immoveable piece *i*, and which holds the ſmall ſpeculum. By means of a dove-tail ſlit it can be moved up and down till we find the poſition of the ſpeculum is right, after which it is to be firmly ſcrewed on to the piece *i*. *m* is a ſmall piece of braſs, having a female ſcrew, in which the rod *r o* is ſcrewed, and which moves the little ſpeculum up or down, as it ſhall be found neceſſary for procuring diſtinct viſion.

210 Method of adjuſting the large mirror.

Having now got all the parts of your teleſcope, it is neceſſary in the firſt place to ſee that the tubes are perfectly ſtraight and round; after which you may proceed to place your mirrors in the teleſcope, and to prove their ſituation by the following method.—AB CD, fig. 8. is a circle drawn on a round piece of paſteboard, having a ſmall hole in the centre at E. FGHI (fig. 9.) is another perforated circular piece of paſteboard, having two hairs croſſing each other as in the figure. The former of theſe is placed juſt behind the large mirror; the latter in the place where the neareſt eye-glaſs ſhould ſtand. If the light paſſing through the ſmall hole in the large circle falls exactly on the interſection of the hairs, it ſhews that the large ſpeculum is properly placed; if not, its ſituation muſt be altered till this is accompliſhed.

Plate CCXXIX.

AB (fig. 10.) ſhews the ſhape of another piece of paſteboard, likewiſe perforated in the centre at C. The ſmall circle is to be of the diameter of the leſſer ſpeculum: and when the paſteboard is put exactly in its focus, the light will paſs ſtraight through the little hole and eye-piece, ſo as to be diſtinctly viſible if the poſition of the ſpeculum is exactly right; but if that is not the caſe, the light will fall either to one ſide or other, and the poſition of the ſpeculum muſt be altered accordingly.

211 Of adjuſting the ſmall ſpeculum.

Fig. 12. Shews a teleſcope of the Newtonian form, in which the plane ſpeculum is ſomewhat nearer the large one than in thoſe formerly deſcribed: in conſequence of which this requires a ſmall eye-piece at the ſide, that the magnifying glaſs may be placed at a ſufficient diſtance from it. This teleſcope is to be adjuſted in the following manner. Let there be provided two circles of paſteboard, repreſented fig. 13. and 14. both of which are perforated in ſuch a manner, that the tube of the teleſcope may juſt enter the perforation. The circle fig. 13. is divided into quadrants, at each of which is pricked a hole with a pin. That repreſented fig. 14. is alſo divided into quadrants; but, inſtead of pin-holes, has black lines drawn upon it. The former is to be fixed on the open end of the tube, and the latter on the end where the concave ſpeculum is placed. The teleſcope is then to be turned towards the ſun, ſo that the little ſpecks of light paſſing thro' the pin-holes of the circle fig. 13. fall upon the black circular lines of fig. 14. Have then ready another piece of paſteboard, fig. 15. perforated with pin-holes in five different places as there repreſented. This piece muſt exactly fit the opening of the teleſcope; and while the tube continues thus turned ſtraight to the ſun, look through the eye-piece. If all the ſpecks of light coming through the holes in the paſteboard are ſeen diſtinct in the plane mirror, it is a ſign that the mirrors are in a proper poſition with regard to each other: but if not, ſome of them will not be ſeen at all, or will appear confuſed and indiſtinct; in which caſe, the ſituation of the mirrors muſt be altered till the light appears bright and diſtinct.

212 Of adjuſting the mirrors of a Newtonian teleſcope.

213 Of fixing croſs-hairs in the foci of teleſcopes.

In the application of teleſcopes to aſtronomical inſtruments and many other purpoſes, it is abſolutely neceſſary to fix the plane of the croſs-hairs exactly upon the plane of the picture of an object; which may eaſily be done from a knowledge of the following properties. Firſt, let the interval between the two convex glaſſes of the teleſcope be adjuſted to ſhew an object diſtinctly; and if the hairs appear confuſed, they will ſeem to dance upon the object, while the eye moves ſideways; and in dancing, if they ſeem to move the ſame way as the eye does, they lie behind the picture of the object; but if they move the contrary way, they lie before it; and muſt be removed accordingly, till they appear diſtinct; and then they will alſo ſeem fixed upon the object, notwithſtanding the motion of the eye. Secondly, let the interval between the hairs and the eye-glaſs be firſt adjuſted, till the hairs appear diſtinct: then, if the object appears confuſed, it will alſo appear to dance while the eye moves ſideways; and in dancing, if it moves the ſame way as the eye does, its picture is behind the hairs; if the contrary way, its picture is before them; and to bring it to the hairs, either the object-glaſs muſt be moved, or elſe the hairs and eye-glaſs both together. In both theſe caſes, it is the confuſed object (for the hairs may alſo be called ſo) that ſeems to move, and the diſtinct one to ſtand ſtill; as in viſion with the naked eye. For, to a perſon in motion, ſuppoſe he be walking, any object appears fixed that he fixes his eyes upon and ſees diſtinctly, while the reſt that are nearer or farther off appear confuſed and in motion; the reaſon of it is too obvious to need an explanation. But to ſhew it in the teleſcope, let *h* be the interſection of the croſs-hairs, and *h i k* a pencil of rays flowing from it, which, after refraction through the eye-glaſs *e a i*, belong to the focus *k*, either at a finite or an infinite diſtance. Draw *h e*; the axis of this pencil, cutting the object in Q, and its picture in *q*; and let the emergent rays of the pencil *q a b*, flowing from *q*, cut the emergent rays of the former pencil in the points *p*, and belong to the focus *b*, either at a finite or an infinite diſtance. Now, if the eye be placed at any point *o* in the common axis of theſe pencils, the points *h*, Q, will both appear in the ſame direction *o e*; but if the eye be moved ſideways from *o* to *p*, the point Q will appear in the direction *p a*, and the point *h* in the direction *p i*. And from hence the reaſon of the foregoing caſes will be ſufficiently manifeſt, by attending to the figures. Laſtly, while the focuſes *h q* are disjoined, the mutual inclination of the emergent rays in one pencil, muſt be different from the mutual inclination of the emergent rays in the other; and ſo the humours of the eye cannot be adapted to collect the rays in both pencils to two diſtinct points. If one be diſtinct, the other will be confuſed, and in a different part of the retina; (except when the eye is in the axis:) but when the focuſes *h*, *q*, are united, the focuſes *k*, *b*, of the emergent rays will alſo be united; and conſequently the coinciding rays of both pencils will be united in the ſame point of the retina, wherever the pupil of the eye be placed; and therefore the correſponding points of the object and croſs-hairs will appear fixed together without any parallax.

Plate CCXX fig. 1.

When

OPTICS

Fig. 1.

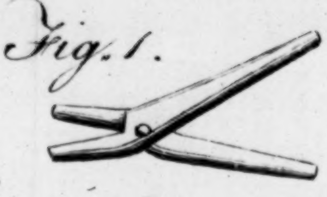


Fig. 18.

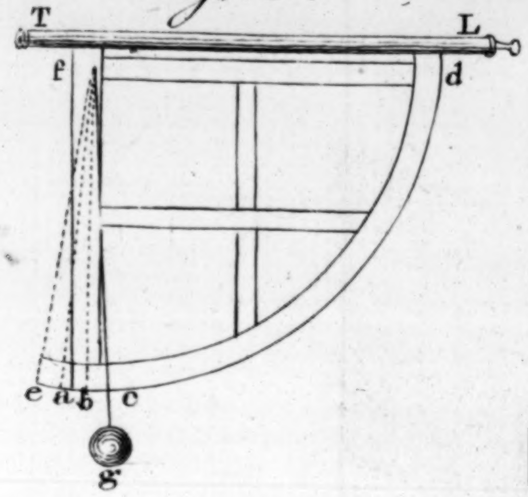


Fig. 2.

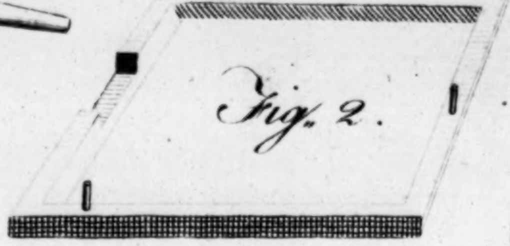


Fig. 3.

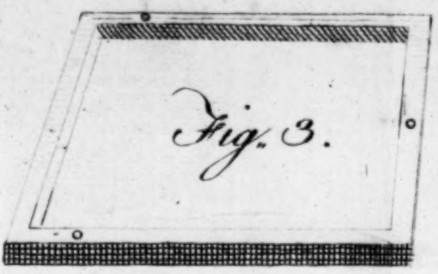


Fig. 4.

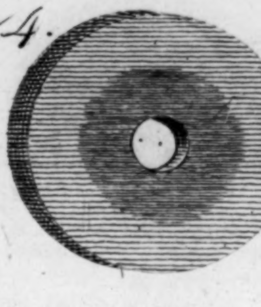


Fig. 6.

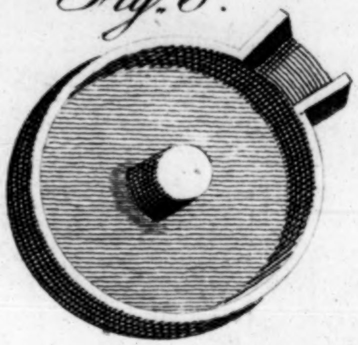


Fig. 17.

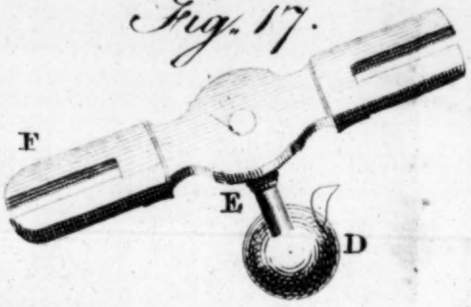


Fig. 7.

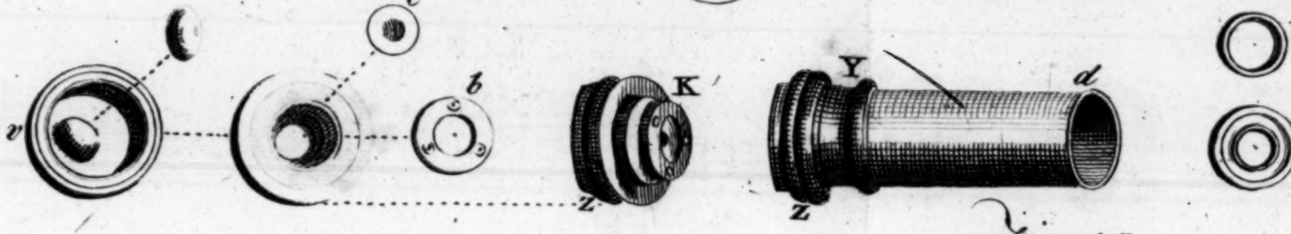


Fig. 19

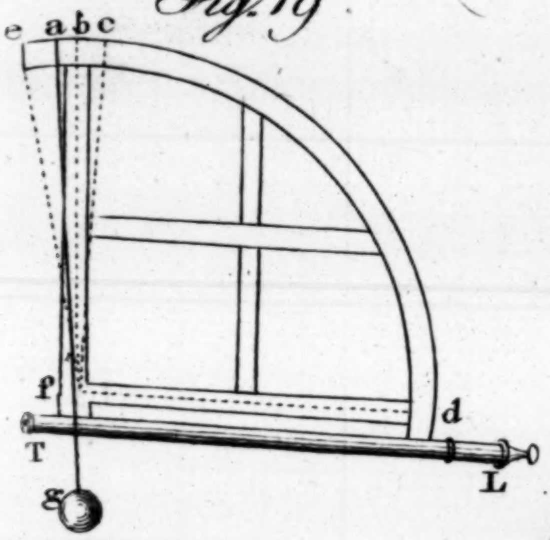


Fig. 14.

Fig. 13.

Fig. 15.

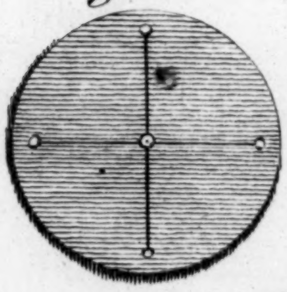


Fig. 20.

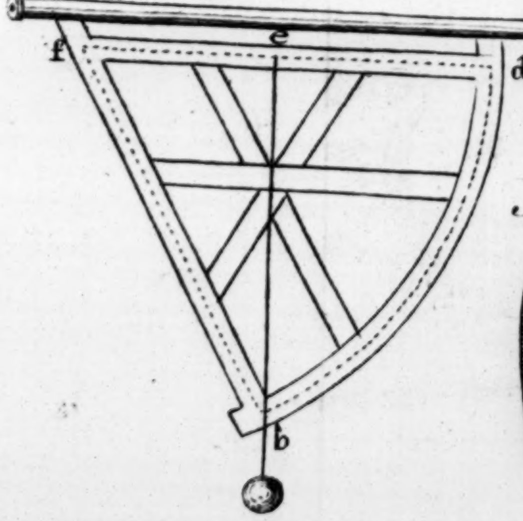
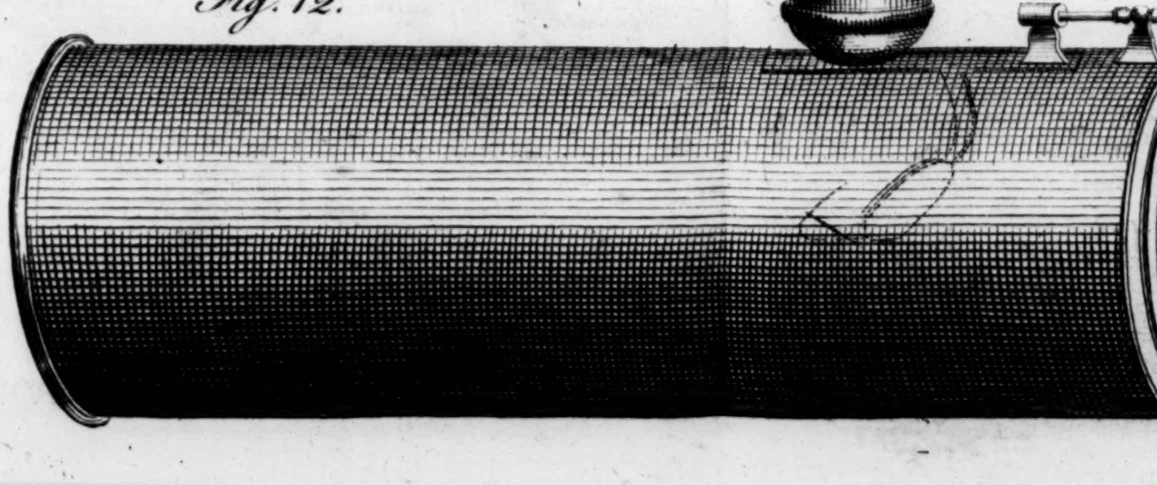


Fig. 11.

Fig. 12.



ICS. Plate CCXXIX

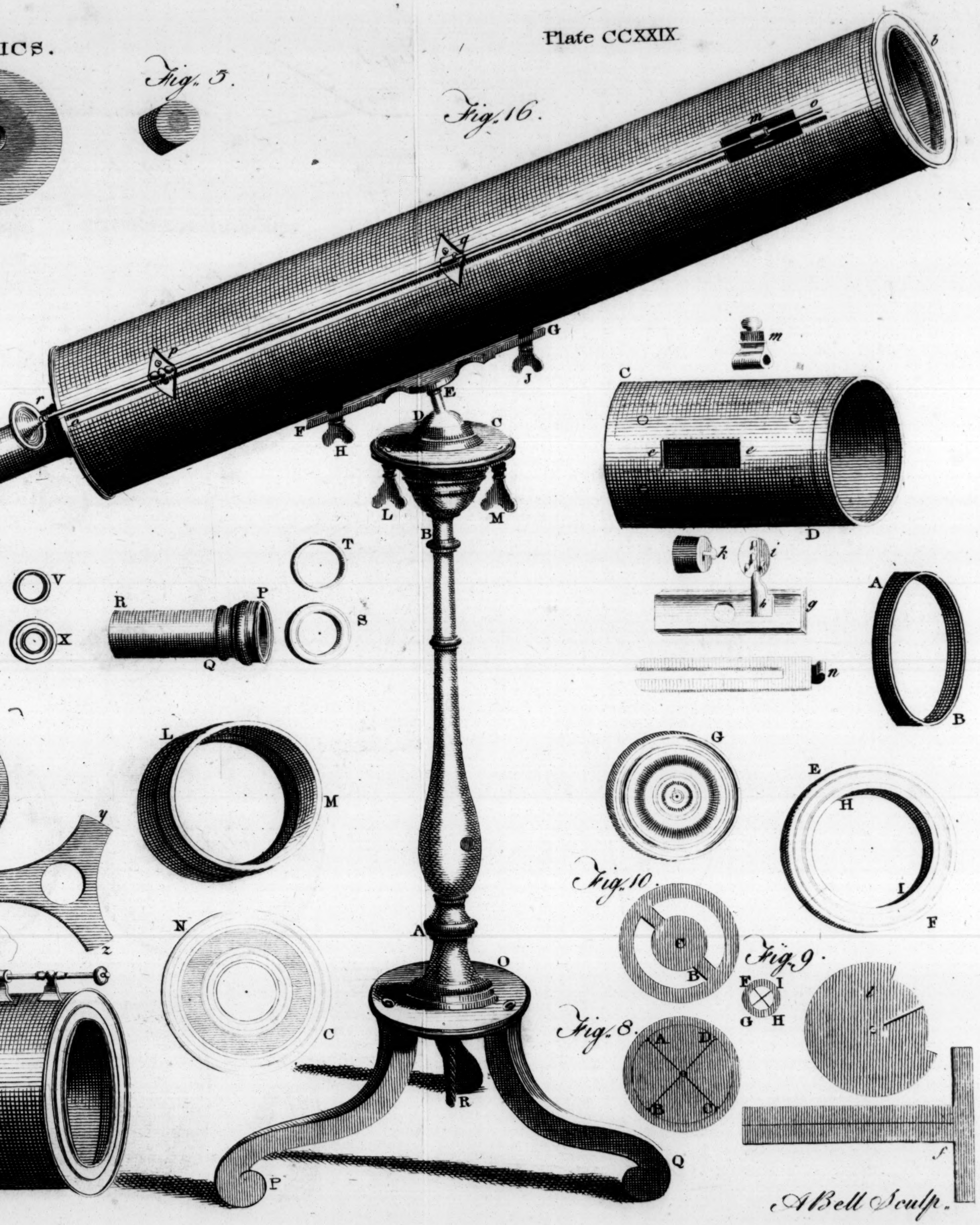


Fig. 3.
Fig. 16.
b
m
o
q
p
r
G
J
E
D
C
F
H
L
M
B
A
O
R
P
Q
C
m
e
e
D
k
i
h
g
n
A
B
T
V
X
R
P
Q
S
L
M
y
z
N
C
G
E
H
I
F
Fig. 10.
C
B
Fig. 9.
E
I
G
H
l
Fig. 8.
A
D
B
C
f

A Bell Sculp.

When the place of the hairs is thus determined, it may be of uſe to meaſure their diſtance from the object-glaſs; which is the exacteſt way of finding its focal diſtance, if the object be very remote. And to keep this diſtance always the ſame whenever the teleſcope is uſed, it is convenient to have marks or ſtops at the end of each joint of the tube. For then, whatever eye-glaſs be applied, the object and hairs will both appear diſtinct at the ſame time, and without parallax. Inſtead of hairs, the fineſt ſilver wires are now made uſe of, but are ſtill called *hairs*.

214 of mation ed.

A line drawn from the interſection of the hairs through the centre of refractions in the object-glaſs, whether it coincides with the axis of the glaſs or is inclined to it, is called the *line of collimation* or *line of ſight*; becauſe this line produced, falls upon the object in that point whoſe image falls upon the interſection of the hairs: and therefore the ſtraight ray that deſcribes this line, anſwers to the viſual ray by which we take aim at an object with plain-ſights. Hence, when the object-glaſs and hairs are firmly fixed in a ſtrong tube, or to a ſtraight ruler, it is manifeſt, that the line of ſight is as immutable with reſpect to the tube, as if two little holes or plain-ſights were ſubſtituted in the places of the interſection of the hairs, and of the centre of refractions in the object-glaſs.

5 to ad- tele-

XVIII.

In order to ſet the line of ſight parallel to a given line upon the plane of an inſtrument, the object-glaſs muſt be firmly fixed, and the ring or plate that carries the croſs-hairs muſt have two gradual motions in its own plane by two ſcrews at right angles to each other; for by this means the interſection of the hairs may be moved to any given point in that plane. Theſe motions are effected by three braſs plates laid over one another. The uppermoſt, having a circular hole in it, over which the hairs are ſtrained, ſlides over the middlemoſt in the direction of an oblong hole cut in it, whoſe breadth is ſomewhat greater than that of the hole above it; and theſe two together ſlide ſideways over the undermoſt plate, in which there is a larger oval hole. We ſhall deſcribe theſe plates more particularly in a contrary order. On each ſide of the oval hole in the middle of the plate R laſt mentioned, two braſs ledges *m*, *n*, are firmly riveted to receive the dove-tailed ſides of the plate S; and the contiguous ends of both theſe plates are turned up ſquare at *b* and *e*; and through a hole *b*, in the middle of the part turned up in the larger plate R, there works a pretty thick ſcrew *a b c*, whoſe fore-end *c* being filed to a neck, goes through a hole *e* in the lip of the other plate S; and in the end of the neck *c* there is made a ſmall ſcrew hole to receive a ſcrew-pin *d*; ſo that by turning the ſcrew *a b c* with a kind of a watch-key, the plate S is moved backwards or forwards between the ledges *m*, *n*. The figure T repreſents two more ledges *o*, *p*, that are to be riveted upon the plate S; theſe ledges are part of the plate T turned up at right angles to them, in which part there is the like contrivance of a ſcrew *a b c d* to move a third plate V between the ledges *o*, *p*, at right angles to the former motion. The ſilver wires are ſtrained over the hole in the plate V by four ſmall peggs, that fix them in four little holes. The other end of the plate R, oppoſite to the part *b* that carries the ſcrew, is bent ſquare the contrary way to the part *b*; or, which anſwers the ſame purpoſe, one ledge *e f* of the plate X bent ſquare, is riveted to the backſide of the plate R at the end oppoſite to the ſcrew *b*; and its other ledge *g h* is ſcrewed to the ſide of the tube of the teleſcope; and the necks of the ſcrews go through long ſlits in this ledge, to give liberty of placing it accurately at the due diſtance from the object-glaſs: and for the purpoſe of letting this braſs work into the tube, two large ſlits muſt be cut in two contiguous ſides of it: one of which may beſt be covered with a thin piece of horn, to admit the light of a candle upon the hairs in obſerving ſmall ſtars in the night time.

Fig. 5.

To make the line of ſight through a moveable teleſcope parallel to a given line YZ upon a fixed plane; let the ends of the tube of the teleſcope, whether ſquare or cylindrical, be put through two holes in two ſquare plates *a b c d*, and *e f g h*, made exactly equal to each other, and ſo fixed to the tube that the ſides of the one may be exactly parallel to the ſides of the other; which is eaſily done by applying their corners *a*, *e*, to the given line YZ, and by drawing two lines *a i*, *e k*, perpendicular to it, upon the given plane, and by making all the correſponding ſides, as *a b*, *e f*, coincide with theſe perpendiculars. Then obſerve what point of a remote object is covered by the interſection of the hairs when the corners *a*, *e*, touch the given line YZ, and likewiſe what other point is covered by them when the oppoſite corners *c*, *g*, touch the ſame line in the ſame places, that is, when the teleſcope is turned upſide down or half round. Then conceiving theſe two points of the object to be connected by a ſtraight line, move the croſs-hairs by the two ſcrews, till you judge their interſection biſects that line; and by repeating the ſame practice, you may ſoon bring the interſection of the hairs to cover one and the ſame point of the object, when the oppoſite corners of the ſquares are ſucceſſively applied to the line YZ; and then the line of ſight will be parallel to it.

Fig. 6.

To ſhew the reaſon of this practice, we may ſuppoſe the centre of refraction in the object-glaſs to be any point l of the ſquare $a b c d$, and the interſection of the hairs to be any point m of the ſquare $e f g h$. Upon the plane of the firſt ſquare, and through its centre o, draw $l o \lambda$, and take $o \lambda$ equal to $o l$; alſo upon the plane of the ſecond ſquare, and through its centre p, draw $m p \mu$, and take $p \mu$ equal to $p m$. Join $l m$ and $\lambda \mu$; and ſuppoſing $l n$ and $\lambda \nu$ parallel to the axis $o p$, join $m n$, $n \nu$, $\nu \mu$. Then becauſe the reſpective ſides about the equal angles $m p n$, $\mu p \nu$, are made equal, the lines $m n$, $\mu \nu$, oppoſite to them, are alſo equal and parallel. Now the parallel lines $n l$, $p o$, $\nu \lambda$, produced will fall upon a remote object in three points ſo cloſe together as to appear like a ſingle point thro' the teleſcope; and conſequently the planes of the parallel triangles $l m n$, $\lambda \mu \nu$, produced, will cut the ſame object in two parallel lines ſo cloſe together as to appear but one line through the teleſcope; and ſince the angles $m l n$, $\mu \lambda \nu$, are equal, the interſection of the hairs, now at m and then turned half round to μ, will cover two points in that line equidiſtant from the point abovementioned, and on oppoſite ſides of it: therefore, by removing the interſection from m to n, it will appear to biſect the interval between thoſe two points; and then the line of ſight $n l$ will be parallel to the axis *po*, and to the ſides of the parallelopiped, and alſo to the given line YZ.

A teleſcope thus prepared, may be uſeful upon ſeveral occaſions; as if it be required to rectify the hairs in a teleſcope fixed to any inſtrument, ſo as to ſet the line of ſight parallel to a given line upon the plane of the inſtrument. Apply the corners of the ſquares of the teleſcope abovementioned to the given line, and obſerving what point of a remote object is covered by its croſs hairs, move the croſs hairs of the fixed teleſcope till they cover the ſame point of the object, and the buſineſs is done.

215 Of rectifying the ſights of quadrants and ſectants by a plumb-line.

But the teleſcopic ſights of quadrants and ſectants, whoſe planes may be readily placed in any given poſture, may be rectified by a plumb-line. We ſhall here tranſcribe an account of theſe rectifications from Mr Molyneux's Dioptrics, p. 238. "I come now to the rectification of theſe ſights on quadrants and ſextants, for taking angles. This may be done either before or after the diviſion into degrees, &c. are made on the limb of the quadrant. If it be done before, then we ſuppoſe the teleſcope TL fixed to the quadrant, which we ſuppoſe continued a little farther than the fourth part of a circle. Chooſing then an object pretty near the horizon; let us look thro' the teleſcope, in the uſual poſture of obſervation, and obſerve the point in the object marked by the croſs-hairs; and at the ſame time we are to note moſt nicely the point *c*, which the plumb-line *fcg*, hung from the centre *f* of the quadrant, cuts on the limb. Then we are to invert the quadrant into the poſture of fig. 19. (which is eaſily done by the uſual contrivances for managing great quadrants, by toothed ſemicircles and endleſs ſcrews) keeping ſtill the teleſcope TL nearly upon the ſame height from the ground as before, unleſs the object we look at be ſo far diſtant, that the breadth of the quadrant ſubtends but an inſenſible angle. But yet for certainty, it is better to keep the teleſcope, as it is ſaid, upon the ſame height from the floor; then direct the teleſcope TL, that the croſs-hairs may cover exactly the ſame point in the object, as before in the poſture of fig. 18. And hanging now the plumb-line *afg* on the limb of the quadrant, let us remove it to and fro, till we find out the exact point *a*, from which the plumb-line being hung, ſhall moſt nicely hang over the centre of the quadrant *f*. Then carefully marking the point *a*, let us divide the arch *ca* into two equal parts in *b*; and drawing *bf*, the point *b* is the point from which we are to begin the diviſions of the quadrant: and the line of collimation through the teleſcopic ſight, ſtands exactly at right angles to the line *bf*. So that the quadrant *bfd* being compleated and divided, the ſaid line of ſight thro' the teleſcope runs exquiſitely parallel to the line *fd*.

Plate CCXXIX. fig. 18. 19.

"In the next place, ſuppoſing the quadrant *bfd* truly compleated and divided; and that we deſigned to fix thereto the teleſcopic ſight TL, ſo that the line of ſight may run exactly at right angles to the line *bf*, or parallel to the line *df*; we are to do as in the foregoing praxis. And if, in dividing the arch *ac*, we find its half exactly coincident with the point *b*, we have our deſire. But if it differs from the point *b*, and falls between *b* and *d*, then the line of collimation through the teleſcope ſtands at an obtuſe angle with the line *bf*; and the inſtrument errs in exceſs: if this half arch fall without *b* and *d*, then the line of collimation makes an acute angle with the line *bf*; and the inſtrument errs in defect. And by often trials, we are to remove the croſs-hairs within the tube, ſo much as is requiſite to correct this error. And when we have thus rectified them to their due place, there they are to be ſtrongly fixed. Or elſe, in obſervations taken by this inſtrument, we are to make allowance for this error; by ſubtracting from (if it be in exceſs), or by adding to (if it be in defect), each obſervation, ſo much as we find the error to be.

"The reaſon of this rectification is moſt plain; for it is manifeſt, that *cfd* wants of a full quadrant, as much as *afd* exceeds a quadrant. So the difference of the two arches in the two poſtures being *ac*; half this difference *bc* added in fig. 18. or *ab* ſubtracted in fig. 19. makes *bd* a complete quadrant.

"If we find our inſtrument errs in taking angles, and we deſire to know the error more nicely than perhaps the diviſions of the inſtrument itſelf will ſhew it, we are to do thus. Suppoſing the quadrant *bfd* already accurately divided, and that the plumb-line plays over the point *c*; and upon the inverſion of the inſtrument, we find that before we can get it to play exactly over the centre *f*, we muſt hang it over the point *e*, ſo that the arch *eb* exceeds *bc* by the arch *ea*; it is plain that the angle *efa* is the error of the inſtrument: for had the plumb-line hung over *a*, and over the centre *f*, in this latter poſture, the inſtrument had been exact; becauſe *a* is as much on one ſide *b*, as *c* is on the other ſide *b*. Wherefore *efa* being the angle by which our inſtrument errs in obſervation, let us turn the inſtrument into the uſual poſture of obſervation, as in fig. 18. and hanging the plumb-line on the centre *f*, let us bring it to play nicely on the point *e*, and obſerve what diſtant object is covered by the croſs-hairs: then let us bring it to play exactly on the point *a*, and obſerve likewiſe what diſtant object is pointed at by the teleſcope-hairs. Laſtly, by a large teleſcope and micrometer, let us meaſure the angle between theſe two objects, and we ſhall have the angle of error much more nicely than it is poſſible the angle *efa* ſhould be given by the diviſions on the limb of the quadrant *ea*. And thus much for adjuſting a quadrant.

"A ſextant is rectified in like manner; if we conſider, that if from the centre *f* to the beginning of the diviſions *d* there be drawn the radius *fd*, and it be divided equally in *c*, and from *c* there be ſuſpended the plumb-line *cb*: when the plumb-line hangs over the 60th degree at *b*, then the line *fd* lies horizontal; and conſequently, if the line of collimation thro' the tube be parallel to *fd*, this line alſo lies horizontal. To try which, whilſt the ſextant ſtands in this poſture, obſerve the object marked by the croſs-hairs; then invert the ſextant, and over the point *b* hang the plumb-line; and when from the point *b* the plumb-line hangs over the middle point *c*, then again is the line *fd* horizontal in this poſture. Mark, then, whether the croſs-hairs cover the ſame object as before: if they do, then the line of collimation is parallel to *fd*; if they do not, but the point in the object marked in this latter poſture be higher than the point marked in the firſt poſture, the inſtrument errs in exceſs; if it be lower, the inſtrument

Fig. 20.

ſtrument errs in defect. And either we are to remove the croſs-hairs, till we bring all to rights, and there fix them; or by the methods before laid down in the rectification of the quadrant, we are to find the quantity of this erroneous angle, and to allow for it in obſervation.

"In inſtruments furniſhed with two pair of teleſcopic ſights, one on a fixed arm, and the other on a moveable arm (by the ancients termed an *alidade*); it is eaſy rectifying the ſights on the moveable arm, thus. After the ſights on the fixed arm are rectified by what foregoes, bring the index of the moveable arm, to the beginning of the diviſions on the limb of the inſtrument, be it quadrant or ſextant, &c. it is then manifeſt, that the line of collimation through the moveable teleſcope (if it be right) ſhould lie parallel to the line of collimation through the fixed teleſcope. Obſerve, therefore, whether the croſs-hairs in both teleſcopes do at the ſame time cut the ſame ſtar, or fall on the ſame point in an object diſtant three or four miles. If they do, then the moveable teleſcope agreeing with the fixed, and the fixed being ſuppoſed rectified to the diviſions on the inſtrument, the moveable is right likewiſe. But if the hairs in the moveable teleſcope do not agree in marking the ſame point with the croſs-hairs in the fixed teleſcope, then the hairs in this moveable teleſcope are to be removed (by whatever contrivance there is for that purpoſe) and brought to rights, and there fixed."

There are other methods propounded for rectifying teleſcopic ſights on other ſorts of inſtruments, by means of obſervations towards the zenith, as our former methods have been employed towards the horizon. But it is ſufficient here to lay down only what foregoes, as being of the greateſt and moſt frequent uſe: referring for the others to M. Picard's "Treatiſe of the meaſure of a degree of a great circle of the earth," publiſhed at the end of the "Memoirs of a Natural Hiſtory of animals, &c." by the Royal Academy at Paris; tranſlated into Engliſh and printed at London 1688, folio.

Sect. VII. *Of the different Merits of Microſcopes and Teleſcopes, compared with one another; how far we may reaſonably depend on the Diſcoveries made by them, and what hopes we may entertain of further Improvements.*

216 vantages m the of mi- ſcopes d tele- pes.

The advantages ariſing from the uſe of microſcopes and teleſcopes depend in the firſt place upon their property of magnifying the minute parts of objects, ſo that they can by that means be more diſtinctly viewed by the eye; and, ſecondly, upon their throwing more light into the pupil of the eye than what is done without them. The advantages ariſing from the magnifying power would be extremely limited, if they were not alſo accompanied by the latter: for if the ſame quantity of light is ſpread over a large portion of ſurface, it becomes proportionably diminiſhed in force; and therefore the objects, though magnified, appear proportionably dim. Thus, though any magnifying glaſs ſhould enlarge the diameter of the object 10 times, and conſequently magnify the ſurface 100 times, yet if the focal diſtance of the glaſs was about eight inches, (provided this was poſſible), and its diameter only about the ſize of the pupil of the eye, the object would appear 100 times more dim when we looked thro' the glaſs, than when we beheld it with our naked eyes; and this, even on a ſuppoſition that the glaſs tranſmitted all the light which fell upon it, which no glaſs can do. But if the focal diſtance of the glaſs was only four inches, tho' its diameter remained as before, the inconvenience would be vaſtly diminiſhed, becauſe the glaſs could then be placed twice as near the object as before, and conſequently would receive four times as many rays as in the former caſe, and therefore we would ſee it much brighter than before. Going on thus, ſtill diminiſhing the focal diſtance of the glaſs, and keeping its diameter as large as poſſible, we will perceive the object more and more magnified, and at the ſame time very diſtinct and bright. It is evident, however, that with regard to optical inſtruments of the microſcopic kind, we muſt ſooner or later arrive at a limit which cannot be paſſed. This limit is formed by the following particulars. 1. The quantity of light loſt in paſſing through the glaſs. 2. The diminution of the glaſs itſelf, by which it receives only a ſmall quantity of rays. 3. The extreme ſhortneſs of the focal diſtance of great magnifiers, whereby the free acceſs of the light to the object which we wiſh to view is impeded, and conſequently the reflection of the light from it is weakened. 4. The aberrations of the rays, occaſioned by their different refrangibility.

217 Limits of the advantages in the uſe of microſcopes.

To underſtand this more fully, as well as to ſee how far theſe obſtacles can be removed, let us ſuppoſe the lens made of ſuch a dull kind of glaſs that it tranſmits only one half of the light which falls upon it. It is evident that ſuch a glaſs, of four inches focal diſtance, and which magnifies the diameter of an object twice, ſtill ſuppoſing its own breadth equal to that of the pupil of the eye, will ſhew it four times magnified in ſurface, but only half as bright as if it was ſeen by the naked eye at the uſual diſtance; for the light which falls upon the eye from the object at eight inches diſtance, and likewiſe the ſurface of the object in its natural ſize, being both repreſented by 1, the ſurface of the magnified object will be 4, and the light which makes that magnified object viſible only 2; becauſe though the glaſs receives four times as much light as the naked eye does at the uſual diſtance of diſtinct viſion, yet one half is loſt in paſſing through the glaſs. The inconvenience in this reſpect can therefore be removed only as far as it is poſſible to increaſe the clearneſs of the glaſs, ſo that it ſhall tranſmit nearly all the rays which fall upon it; and how far this can be done, hath not yet been aſcertained.

The ſecond obſtacle to the perfection of microſcopic glaſſes is the ſmall ſize of great magnifiers, by which, notwithſtanding their near approach to the object, they receive a ſmaller quantity of rays than might be expected. Thus, ſuppoſe a glaſs of only $\frac{1}{10}$th of an inch focal diſtance; ſuch a glaſs would increaſe the viſible diameter 80 times, and the ſurface 6400 times. If the breadth of the glaſs could at the ſame time be preſerved as great as that of the pupil of the eye, which we ſhall ſuppoſe $\frac{1}{10}$th of an inch, the object would appear magnified 6400 times, at the ſame time that every part of it would be as bright as it appears to the naked eye. But if we ſuppoſe that this magnifying glaſs is only $\frac{1}{20}$th of an inch in diameter, it will then only receive $\frac{1}{4}$th of the light which otherwiſe would have fallen upon it; and therefore, inſtead of communicating to the magnified object a quantity of illumination equal to 6400, it would communicate only one equal to 1600, and the magnified object would appear four times as dim as it does to the naked eye. This inconvenience however is ſtill capable of being removed, not indeed by increaſing the diameter of the lens, becauſe this muſt be in proportion to its focal diſtance, but by throwing a greater quantity of light on the object. Thus, in the above-mentioned example, if four times the quantity of light which naturally falls upon it could be thrown upon the object, it is plain that the reflection from it would be four times as great as in the natural way; and conſequently the magnified image, at the ſame time that it was as many times magnified as before, would be as bright as when ſeen by the naked eye. In tranſparent objects this can be done very effectually by a concave ſpeculum, as in the reflecting microſcope already deſcribed: but in opaque objects the caſe is ſomewhat more doubtful; neither do the contrivances for viewing theſe objects ſeem entirely to make up for the deficiencies of the light from the ſmallneſs of the lens and ſhortneſs of the focus. When a microſcopic lens magnifies the diameter of an object 40 times, it hath then the utmoſt poſſible magnifying power, without diminiſhing the natural brightneſs of the object.

218
Utmoſt magnifying power of a microſcope, without diminiſhing the light.

The third obſtacle ariſes from the ſhortneſs of the focal diſtance in large magnifiers: but in tranſparent objects, where a ſufficient quantity of light is thrown on the object from below, the inconvenience ariſes at laſt from ſtraining the eye, which muſt be placed nearer the glaſs than it can well bear; and this entirely ſuperſedes the uſe of magnifiers beyond a certain degree.

The fourth obſtacle ariſes from the different refrangibility of the rays of light, and which frequently cauſes ſuch a deviation from truth in the appearances of things, that many people have imagined themſelves to have made ſurpriſing diſcoveries, and have even publiſhed them to the world; when in fact they have been only as many optical deceptions, owing to the unequal refractions of the rays. For this there ſeems to be no remedy, except the introduction of achromatic glaſſes into microſcopes as well as teleſcopes. How far this is practicable, hath not yet been tried; but when theſe glaſſes ſhall be introduced, (if ſuch introduction is practicable), microſcopes will then undoubtedly have received their ultimate degree of perfection.

219
Comparative goodneſs of the different kinds of teleſcopes.

With regard to teleſcopes, thoſe of the refracting kind have evidently the advantage of all others, where the aperture is equal, and the aberrations of the rays are corrected according to Mr Dollond's method; becauſe the image is not only more perfect, but a much greater quantity of light is tranſmitted than what can be reflected from the beſt materials hitherto known. Unluckily, however, the imperfections of the glaſs ſet a limit to theſe teleſcopes, as hath already been obſerved, ſo that they cannot be made above three feet and an half long. On the whole, therefore, the reflecting teleſcopes are preferable in this reſpect, that they may be made of dimenſions greatly ſuperior; by which means they can both magnify to a greater degree, and at the ſame time throw much more light into the eye.

With regard to the powers of teleſcopes, however, they are all of them exceedingly leſs than what we would be apt to imagine from the number of times which they magnify the object. Thus, when we hear of a teleſcope which magnifies 200 times, we are apt to imagine, that, on looking at any diſtant object through it, we ſhould perceive it as diſtinctly as we would with our naked eye at the 200th part of the diſtance. But this is by no means the caſe; neither is there any theory capable of directing us in this matter: we muſt therefore depend entirely on experience.

The beſt method of trying the goodneſs of any teleſcope is by obſerving how much farther off you are able to read with it than you can with the naked eye. But that all deception may be avoided, it is proper to chooſe ſomething to be read where the imagination cannot give any aſſiſtance, ſuch as a table of logarithms, or ſomething which conſiſts entirely of figures; and hence the truly uſeful power of the teleſcope is eaſily known. In this way Mr Short's large teleſcope, which magnifies the diameter of objects 1200 times, is yet unable to afford ſufficient light for reading at more than 200 times the diſtance at which we can read with our naked eye.

With regard to the form of reflecting teleſcopes, in is now pretty generally agreed, that when the Gregorian ones are well conſtructed, they have the advantage of thoſe of the Newtonian form. One advantage evident at firſt ſight is, that with the Gregorian teleſcope an object is perceived by looking directly thro' it, and conſequently is found with much greater eaſe than in the Newtonian teleſcope, where we muſt look into the ſide. The unavoidable imperfection of the ſpecula common to both, alſo gives the Gregorian an advantage over the Newtonian form. Notwithſtanding the utmoſt care and labour of the workmen, it is found impoſſible to give the metals either a perfectly ſpherical, or a perfectly parabolical form. Hence ariſes ſome indiſtinctneſs of the image formed by the great ſpeculum, which is frequently corrected by the little one, provided they are properly matched. But if this is not done, the error will be made much worſe: and hence many of the Gregorian teleſcopes are far inferior to the Newtonian ones; namely, when the ſpecula have not been properly adapted to each other. There is no method by which the workman can know the ſpecula which will fit one another, without a trial; and therefore there is a neceſſity for having many ſpecula ready made of each ſort, that in fitting up a teleſcope thoſe many be choſen which beſt ſuit each other.

220
Formulæ for determining th brightneſ of objects viewed b teleſcope or microſcopes.

The brightneſs of any object ſeen through a teleſcope, in compariſon with its brightneſs when ſeen by the naked eye, may in all caſes be eaſily found by the following formula. Let n repreſent the natural diſtance of a viſible object, at which it can be diſtinctly ſeen; and let d repreſent its diſtance from the object-glaſs of the inſtrument. Let m be the magnifying power of the inſtrument; that is, let the viſual angle ſubtended at the eye by the object when at the diſtance n, and viewed without the inſtrument, be to the viſual angle produced by the inſtrument as 1 to m. Let a be the diameter of the object-glaſs, and p be that of the pupil. Let the inſtrument be ſo conſtructed, that no parts of the pencils are intercepted for want of ſufficient

Mechaniſm of Optical Inſtruments

ent apertures of the intermediate glaſſes. Laſtly, let the light loſt in reflection or refraction be neglected.

The brightneſs of viſion through the inſtrument will be expreſſed by the fraction $\left(\frac{a\,n}{m\,p\,d}\right)^2$, the brightneſs of natural viſion being 1. But although this fraction may exceed unity, the viſion through the inſtrument will not be brighter than natural viſion. For, when this is the caſe, the pupil does not receive all the light tranſmitted through the inſtrument.

In microſcopes, n is the neareſt limits of diſtinct viſion, nearly 8 inches. But a difference in this circumſtance, ariſing from a difference in the eye, makes no change in the formula, becauſe m changes in the ſame proportion with n.

In teleſcopes, n and d may be accounted equal, and the formula becomes $\frac{a^2}{m\,p^2}$.

INDEX.

AERIAL ſpeculums mentioned by Mr Grey, n°46. A phenomenon ſimilar to what is exhibited by them explained by M. le Cat, 61
ir ſtrongly reflects the rays proceeding from beneath the ſurface of water, 36
lkaline ſalt diminiſhes the mean refraction, but not the diſperſive power, of glaſs, 18
lembert (M. d'), his diſcoveries concerning achromatic teleſcopes, p. 5485
hazen's diſcoveries concerning the refraction of the atmoſphere, 6. His conjectures about the cauſe of it, *ib.* He gave the firſt hint of the magnifying power of glaſſes, *ib*
parent place of objects ſeen by reflection, firſt diſcovered by Kepler, 26
moſphere varies in its refractive power at different times, 19
out (Mr), makes an object-glaſs of an extraordinary focal length, 85

B.

con (Roger), his diſcoveries; 8
on (Lord), his miſtake concerning the poſſibility of making images appear in the air, 25
ms of light: remarkable appearance of the boundaries of two contiguous ones, 5499, col. 2.
ume (Mr), cannot fire inflammable liquids with burning-glaſſes, 43
ley (Dr), his hypotheſis concerning the apparent place of objects, p. 5570, l. 2. Objected to by Dr mith, *ib*
cular teleſcope invented by ther Rheita, 83
marble, in ſome caſes reflects very powerfully, 35
Bouguer's experiments concerning the quantity of light loſt by reflection, 32. His obſervations concerning the apparent place of objects, p. 5572, col. 2.
Boyle's experiments concerning the light of differently coloured ſubſtances, 27
Briſtle, curious appearance of the ſhadow of one, 55
Burning-glaſſes of the ancients deſcribed, 24

C.

Camera obſcura explained, p. 5583.
Campani, a celebrated maker of teleſcopes, 84. On what the goodneſs of his teleſcopes depended, *ib*
Candle, ſometimes appears multiplied when ſeen through a chink, p. 5569, col. 2.
Cat (M. le), explains a ſingular phenomenon, 61
Cat, experiment with one plunged under water, p. 5535, col. 1.
Celeſtial obſervations: how to make them, p. 5565
Clouds: why they cauſe certain motions in the ſhadows of bodies, 62
Cold, why moſt intenſe on the tops of mountains, 42
Colours diſcovered to ariſe from refraction, 15. Suppoſed by Dechales to ariſe from the inflection of light, 49. Produced by a mixture of ſhadows, 57
Concave glaſſes for ſhort-ſighted people, when firſt invented, 67
Contact of bodies in many caſes apparent without being real, 45
Cryſtal hath ſome reflective properties different from other tranſparent ſubſtances, 38
Cylinders: experiments by Maraldi concerning their ſhadows, 53

D.

Deception in viſion: a remarkable one explained by M. le Cat, p. 5574, col. 2.
Dechales's obſervations on the inflection of light, 49
Deſcartes: his diſcoveries concerning viſion, 65
Dioptric inſtruments: difficulties attending the conſtruction of them, 110
Diſtance of objects not judged of merely by the angle under which they are ſeen, p. 5570, col. 2
Divini; a celebrated maker of teleſcopes, 84. Microſcopes made by him, 98
Dollond (Mr), diſcovers a method of correcting the errors ariſing from refraction, 17. He diſcovers a miſtake in one of Sir Iſaac Newton's experiments, p. 5483. Diſcovers the different refractive and diſperſive power of glaſs, p. 5483. Difficulties occurring in the execution of his plan, 5484. His improvements in the refracting teleſcope, 90

E.

Equatorial teleſcope, or portable obſervatory, n° 92. and p. 5603
Euler (Mr), firſt ſuggeſted the thought of improving refracting teleſcopes, 17. His controverſy with Clairault, &c. *ib*
Eye: the denſity and refractive powers of its humours firſt aſcertained by Scheiner, 64. Deſcription of it, 115. Dimenſions of the inſenſible ſpot of it, 120
Eyes are ſeldom both equally good, p. 5569, col. 2.

F.

Fontana claims the honour of inventing teleſcopes, 72
Funk (Baron Alexander), his obſervation concerning the light in mines, 46

G.

Galilean teleſcope of more difficult conſtruction than others, 79
Galileo makes a teleſcope without any pattern, 73. Account of his diſcoveries with it, 74. Why ſurnamed *Lyncæus*, 75. Was ignorant of the true rationale of teleſcopes, 77
Glaſs globes: their magnifying powers known to the ancients, 3. Different kinds of them, *ib.* Table of the different compoſitions of glaſs for correcting the errors in reflecting teleſcopes, p. 5486, Shew various colours when ſplit into thin laminæ, n° 30. Table of the quantities of light reflected from glaſs not quick-ſilvered, at different angles of incidence, p. 5594
Glaſſes: difference in their powers of refraction and diſperſion of the light, p. 5483
Globes have ſhorter ſhadows than cylinders, n° 54, 56. Remarkable difference between their ſhadows and thoſe of metalline plates, 56
Globules for microſcopes, how made by Adams, 101. See *Microſcope.*
Graphical perſpective, p. 5584
Grey (Mr), his temporary microſcopes, p. 5591
Grimaldi firſt obſerves that colours ariſe from refraction, 15. Inflection of light firſt diſcovered by him, p. 5497, col. 2. His diſcoveries concerning this inflection, n° 48.

H.

Hairs, remarkable appearance of

of their ſhadowss, 56
Hartſoeker's microſcopes, 98
Helioſtata deſcribed, p. 5601
Hire (M. de la), his reaſon why rays of light ſeem to proceed from luminous bodies, when viewed with the eyes half-ſhut, 50
Hooke (Dr), his diſcoveries concerning the inflection of light, 47. His objection againſt Hevelius founded on a miſtake, 125
Horizon, its extent on a plane ſurface, p. 5567, col. 1.
Horizontal moon, Ptolemy's hypotheſis concerning it, 5

I.

Janſen (Zacharias), the firſt inventor of teleſcopes, 70. Made the firſt microſcope, 95, 96
Images: Lord Bacon's miſtake concerning the poſſibility of making them appear in the air, 25. Another on the ſame ſubject by Vitellio, *ib.* B. Porta's method of producing this appearance, *ib.* Kircher's method, *ib.* Images of objects appear double when a quantity of water is poured into a veſſel containing quickſilver, p. 5494
Inflection of light, diſcoveries concerning it, p. 5497, col. 2. Dr Hooke's diſcoveries concerning it, 47. Grimaldi's obſervations, 48. Dechales's obſervations, 49. Sir Iſaac Newton's diſcoveries, 51. Maraldi's diſcoveries, 52
Inverſion, a curious inſtance of it obſerved by Mr Grey, 46
Irradiations of the ſun's light explained, 146, 147. Not obſerved by moon-light, 148. More frequent in ſummer than in winter, 149
Jupiter's ſatellites diſcovered by Janſen, 71. by Galileo, 74

K.

Kepler firſt diſcovered the true reaſon of the apparent place of objects, 26. His diſcoveries concerning viſion, 63. Improved the conſtruction of teleſcopes, 80. His method firſt put in practice by Scheiner, 81

L.

Lead increaſes the diſperſive power of glaſs, p. 5485
Lenſes, their effects firſt explained by Kepler, 77. Different kinds of them, p. 5530, col. 2. How to find their foci, n° 114. Of the appearances of objects thro' them, p. 5441—5444. The uſes of having ſeveral lenſes in a compound microſcope, p. 5577, col. 2. How to grind them for teleſcopes and microſcopes, p. 5609—5617
Leeuwenhoek's microſcopes, 99
Light, its phenomena difficult to be accounted for, 1. Quantity of it abſorbed by plaſter of Paris, 40. By the moon, *ib.* Mr Melville's obſervations on the manner in which bodies are heated by it, 42. No heat produced by it in a tranſparent medium unleſs it falls on the ſurface, *ib.* Of its different refrangibility, p. 5554—5558. M. Bouguer's contrivances for meaſuring it, n° 152. Of its general properties, p. 5519, col. 2.
Lignum nephriticum, remarkable properties of its infuſion, 28
Lines can be ſeen under ſmaller angles than ſpots, and why, 125
Liquid ſubſtances cannot be fired by the ſolar rays concentrated, 43

M.

Magic lanthorn, p. 5584
Magnitudes, why we are ſo frequently deceived concerning them, p. 5571, col. 2.
Mairan (M.), his obſervations on the inflection of light, 58
Maraldi's diſcoveries concerning the inflection of light, 52
Maurolycus, his diſcoveries, 9, 63
Media of different kinds; appearances of objects thro' them, p. 5541
Mery (M.), ſtrange experiment of his with a cat, p. 5535, col. 1.
Melville (Mr), a curious phenomenon explained by him, p. 5574, col. 2.
Microſcopes, their hiſtory, 9. Made by Janſen, 95, 96. By Divini, 97. By Hartſoecker, 98. By Leeuwenhoek, 99. By Wilſon, 100. Temporary ones by Mr Grey, 102. Reflecting microſcopes by Dr Barker, 103. Dr Smith's reflecting microſcope, 104. Solar microſcope, 105. Microſcope for opaque objects, *ib.* Reflected light introduced into the ſolar microſcope, 106. Martin's improvements in it, 107. Microſcopes with ſix glaſſes, 109. Microſcopes of various kinds deſcribed, p. 5577. How to preſerve the diſtinctneſs of objects in them, p. 5578. Mr Martin's method of increaſing the light on any object, n° 164. The ſingle one deſcribed, p. 5855. Single with reflection, p. 5586. Double reflecting and refracting, *ib.* For opaque objects, p. 5587. Solar, p. 5588. Univerſal, p. 5589. Clark's improved pocket-microſcope, p. 5590. Extempore microſcopes, p. 5591. To find the magnifying power of microſcopes, p. 5592. To find the real ſize of objects ſeen by microſcopes, p. 5594. Of the field of view in microſcopes, p. 5595. Of microſcopic objects and the method of preparing them, p. 5595. How to make glaſs-globules for them, p. 5609. Advantages ariſing from the uſe of microſcopes, p. 5635
Mines better illuminated in cloudy than in clear weather, 46
Mirrors, plane ones deſcribed, p. 5575. Why three or four images of objects are ſometimes ſeen in them, 160. Concave and convex ones, p. 5576. Aerial images formed by concave ones, 161
Miſt cauſes objects to appear larger than their natural ſize, p. 5569
Moon, Maraldi's miſtake concerning the ſhadow of it, 55. Why ſhe appears more dull when eclipſed in her perigee than in her apogee, n° 151. Variation of her light at different altitudes, 152. Calculation of her light by M. Bouguer, 156. By Dr Smith, 157. By Mr Michell, 158.
Moon-eyed people, why ſo called, n° 120.
Mudge's directions for grinding the ſpecula of teleſcopes, p. 5623, col. 1.
Multiplying glaſs deſcribed, p. 5575.

N

Newton (Sir Iſaac), his dif coveries concerning colours n° 15. Miſtaken in one his experiments, p. 548 His diſcoveries concernin the inflection of light, n° 5
Nollet (Abbé), cannot fire i flammable liquids by burn ing glaſſes, 43

O.

Objects appear magnified whe viewed through ſmall hole 78. Why ſeen upright, 11 Of their apparent plac magnitude, and diſtanc p. 5568. Why they a pear ſo ſmall when ſeen fro an high building, p. 557 Why a very long row them muſt appear circula p. 5567.
Object-glaſſes of an extraord nary focal length made different perſons, 85. Ho to centre an object-gla p. 5617.
Obſervatory (Portable). S *Equatorial Teleſcope.*
Optic nerve inſenſible of ligh 117, 118.
Optical inſtruments, diſcoveri concerning them, p. 550 Different inſtruments d ſcribed, 5575. Their m chaniſm, 5609.
Optics, the firſt treatiſe on th ſcience written by Claudi Ptolemæus, 4. Account Vitellio's treatiſe on opti 7. Of a treatiſe on opti attributed to Euclid, 23

P.

Painters cannot perfectly d ceive the eye, p. 5569.
Parallel lines, why they ſe to converge when much e tended, p. 5572
Phenomena explained by t theory laid down in t treatiſe, p. 5561
Planets more luminous at th edges than in the middle their diſks, n° 40
Plates, Maraldi's experime concerning their ſhadows,
Porta (Joannes Baptiſta), diſcoveries, 10
Porterfield (Dr), his opini of the methods of judg of the diſtances of obje p. 5571, col. 2.
Priſms in ſome caſes reflect ſtrongly as quickſilver, 3

R.

Rainbow variouſly accounted for, p. 5561. Explained on the Newtonian principles, p. 5562—5568

Rays of light, why they ſeem to proceed from any luminous object when viewed with the eyes half ſhut, 50

Reflected light, table of its quantity from different ſubſtances, 39

Reflection of light, opinions of the ancients concerning it, 22. Bouguer's experiments concerning the quantity of light loſt by it, 32. Method of aſcertaining the quantity loſt in all the varieties of reflection, *ib.* Buffon's experiments on the ſame ſubject, 33. Bouguer's diſcoveries concerning the reflection of glaſs, and of poliſhed metal, 34. Great differences in the quantity of light reflected at different angles of incidence, 35. No reflection but at the ſurface of a medium, 42. Treatiſe on reflection, p. 5544 Cauſe of reflection, *ib.* Is not performed by the light impinging on the ſolid parts of bodies at the firſt ſurface, n° 127. Nor at the ſecond, 128 Very great from a vacuum, *ib.* Suppoſed to ariſe from a repulſive power, 129. Objections to this hypotheſis, 130. Attractive force ſuppoſed to be the cauſe, 131. Another hypotheſis, 132. Sir Iſaac Newton's hypotheſis, 133. Laws of reflection, p. 5546—5551

fracting teleſcopes, how amended by Mr Dollond, n° 17.

fraction known to the ancients, n° 2. Its law diſcovered by Snellius, 11. Explained by Deſcartes, 12. Fallacy of his hypotheſis diſcovered, 13. Experiments of the Royal Society for determining the refractive powers of different ſubſtances, *ib.* M. de la Hire's experiments on the ſame ſubject, *ib.* Refraction of r accurately determined, 5489. Miſtake of the Academy of Sciences concerning the refraction of air, *ib.* Allowance for refraction firſt thought of by Dr Hooke, n° 14. Colours diſcovered to ariſe from thence, n° 15. Mr Dollond diſcovers how to correct the errors of reflecting teleſcopes ariſing from refraction, n° 17. Refraction defined, 3. Explained by an attractive power, 113. Sines of refraction by different ſubſtances, p. 5521. Laws of refraction particularly explained and demonſtrated, p. 5521——5530.

Retina, its extreme ſenſibility, p. 5570.

Rheita invents the terreſtrial teleſcope, n° 81. and the binocular one, 83.

S.

Saturn's ring diſcovered by Galileo, n° 74.

Scheiner completes the diſcoveries concerning viſion. 64. Firſt puts in practice Kepler's improvements in the teleſcope, n° 81.

Shadows of bodies; obſervations concerning them, 47—60. Bounded by fringes of coloured light, p. 5502, col. 2. Of green and blue ones, n° 138——145. Of the illumination of the ſhadow of the earth by the atmoſphere, n° 150.

Sky, its concave figure explained, p. 5567, col. 1. Why the concavity of it appears leſs than a hemiſphere, 136. Of its blue colour, 137.

Short-ſightedneſs and long-ſightedneſs deſcribed, 123.

Spectacles, when firſt invented, 66.

Specula for reflecting teleſcopes, the beſt compoſition for them, p. 5613. Method of preparing the moulds, caſting and grinding the metals, p. 5619.

Spots of the ſun firſt diſcovered by Galileo, n° 74. M. de la Hire's explanation of the ſpots which float before the eyes of old people, p. 5570.

Stars, their twinkling explained by Mr Michel, n° 20. By Mr Muſchenbroek, 21. By other philoſophers, *ib.* A momentary change of colour obſerved in ſome ſtars, *ib.* Why viſible at the bottom of a well. How obſerved in the day-time, n° 93

Sun and *planets*; variation in the light of different parts of their diſks, n° 155.

Surfaces of tranſparent bodies have the property of extinguiſhing light, and why, n° 37. Suppoſed to conſiſt of ſmall tranſparent planes, 39, 40, 41. Of the appearance of bodies ſeen by light reflected from plane and ſpherical ſurfaces, p. 5551.

T.

Teleſcopes; different accounts of the invention of them, n° 68—70. The firſt an exceedingly good one, 71. One made by Galileo without a pattern, 73. The rationale of them firſt diſcovered by Kepler, 76. General reaſon of their effects, 78. Improved by Kepler, 80. Of the different conſtructions of them, 81. Viſion moſt diſtinct in thoſe of the Galilean kind, 82. Terreſtrial teleſcope invented by Father Rheita, 81. Method of managing them without tubes, 84. Why dioptric teleſcopes muſt be made ſo long, 87. Of the apertures of refracting teleſcopes, 88. Hiſtory of the reflecting teleſcope, 89. Mr Smith's propoſal for ſhortening them, 91. Æpinus's propoſal to bend their tubes, 94. Several kinds of teleſcopes deſcribed, p. 5579. Refracting teleſcope, *ib.* Imperfection in dioptric Teleſcopes, n° 165. Remedied by Mr Dollond, 166. Sir Iſaac Newton's reflecting teleſcope, p. 5582—5597. Gregorian teleſcope, p. 5582.—5599. Dollond's achromatic teleſcope, p. 5597. Method of determining the magnifying power of a teleſcope, p. 5600. Solar teleſcope, p. 5601. Equatorial teleſcope deſcribed, p. 5603. Binocular teleſcope deſcribed, 5604. Of the different parts of which a reflecting teleſcope is compoſed, n° 215. How to adjuſt the mirrors 210, 211. Compariſon of the different kinds of teleſcopes with each other, 219. Difference between the magnifying and truly uſeful power of a teleſcope, *ib.*

Teleſcopic inſtruments for meaſuring time, p. 5607. Teleſcopic ſights: how to rectify them, 215.

Thin plates; Mr Boyle's account of the colours obſervable in them, n° 29. Dr Hooke's account, 30.

Torre (T. di) his extraordinary magnifiers for microſcopes, 108.

Tour (M. du) his obſervations on the inflection of light, n° 59. His hypotheſis by which he accounted for the phenomena, 60.

V.

Vacuum; ſtrong reflections often proceed from it, n° 120—128.

Viſible motion of objects, Dr Porterfield's obſervations on it, p. 5573, col. 2.

Viſion; its nature firſt diſcovered by Maurolycus, n° 9. Diſcoveries concerning it, p. 5507, col. 1. Treatiſe of it, p. 5532. Diſpute concerning its ſeat, n° 119. Bright and obſcure, 121. At different diſtances, 122. Leaſt angle of it, 124. Why ſingle with two eyes, 126. Curious particulars relating to deceptions, p. 5540.

Viſta; why a long horizontal one ſeems to aſcend, p. 5672. col. 1.

W.

Water in ſome caſes reflects more powerfully than quickſilver, n° 35. Table of the quantity of light reflected from it at different angles, p. 5494. Remarkably ſtrong reflection into it from the air, n° 36.

Windmill; why its apparent motion is ſometimes contrary to the real one, p. 5572, col. 2. p. 5574, col. 1.

ilſon's microſcope, n° 100.

OPTIMATES, in Roman antiquity, were, according to Tully, the beſt citizens, who deſired that their actions might be approved of by the better ſort; as the *Populares* were thoſe who, out of a thirſt of vain glory, did not ſo much conſider what was right, as what would pleaſe the populace.

OPUNTIA, INDIAN FIG, or *Prickly Pear*. This plant is by Linnæus joined to the genus of Cactus; though, for reaſons given under that article, we have choſen to conſider it as a genus by itſelf. There are nine ſpecies, all natives of warm climates. The moſt remarkable are, 1. The vulgaris, or common Indian fig. This is found in the warm parts of Europe as well as in America, and grows wild on the ſides of the roads in Sicily, Naples, and Spain; but it is probable that the ſeeds of it may have been brought thither from America. This has oval or roundiſh branches, compreſſed on their two ſides flat, and have ſmall leaves coming out in knots on their ſurface, as alſo on their upper edges, which fall off in a ſhort time; and at the ſame knots are three or four ſharp ſpines, which do not appear unleſs they are cloſely viewed; but, on being handled, they enter the fleſh, ſeparate from the plant, and ſo are very troubleſome and difficult to get out. The branches ſpread near the ground, and frequently trail upon it, putting out new roots; ſo are extended to a conſiderable diſtance, and never riſe in height: theſe are fleſhy and herbaceous while young; but, as they grow old, become drier, of a tough contexture, and have ligneous fibres. The flowers come out on the upper edges of the branches, though ſometimes they are produced on their ſides: theſe ſit upon the embryo of the fruit, and are compoſed of ſeveral roundiſh concave petals, which ſpread open. They are of pale yellow colour, and appear in July and Auguſt. They are ſucceeded by an oblong fruit, whoſe ſkin or cover is ſet with ſmall ſpines in cluſters; and the inſide is fleſhy, of a purple or red colour, in which are lodged many black ſeeds. 1. The cochinilifera, or cochineal fig; ſo called from its being the food of the cochineal inſect. It hath oblong, ſmooth, green branches, which grow erect to the height of 8 or 10 feet, with but very few ſpines, and theſe ſo ſoft that they are not troubleſome when handled. The flowers of this are of a purple colour; and ſit on the embryo of the fruit, like thoſe of the former ſort, but do not expand like them. This kind grows naturally in Jamaica; where it is probable that the true cochineal might be diſcovered if perſons of ſkill were to ſearch for it. The vulgaris is the only kind which can be raiſed in this country without great difficulty; and may be propagated by ſlips, in a light mould.

OR, the French word for *gold*, by which this metal is expreſſed in heraldry. In engraving it is denoted by ſmall points all over the field or bearing. It may be ſuppoſed to ſignify of itſelf, *generoſity*, *ſplendor*, or *ſolidity*; according to G. Leigh, if it is compounded with

Gul.	it ſignifies	Courage.
Azu.		Truſt.
Vor.		Joy.
Pur.		Charity.
Sab.		Conſtancy.

ORACH. See ATRIPLEX.

ORACLE, among the heathens, was the anſwer which the gods were ſuppoſed to give to thoſe who conſulted them upon any affair of importance. It is alſo uſed for the god who was thought to give the anſwer, and the place where it was given.

The credit of oracles was ſo great, that in all doubts and diſputes their determinations were held ſacred and inviolable: whence vaſt numbers flocked to them for advice about the management of their affairs; and no buſineſs of any conſequence was undertaken, ſcarce any peace concluded, any war waged, or any new form of government inſtituted, without the advice and approbation of ſome oracle. The anſwers were uſually given by the intervention of the prieſt or prieſteſs of the god who was conſulted; and generally expreſſed in ſuch dark and unintelligible phraſes, as might be eaſily wreſted to prove the truth of the oracle, whatever was the event. It is not, therefore, to be wondered at, that the prieſts who delivered them were in the higheſt credit and eſteem, and that they improved this reputation greatly to their advantage. They accordingly allowed no man to conſult the gods, before he had offered coſtly ſacrifices, and made rich preſents to them. And to keep up the veneration for their oracles, and to prevent their being taken unprepared, they admitted perſons to conſult the gods only at certain ſtated times; and ſometimes they were ſo cautious, that the greateſt perſonages could obtain no anſwer at all. Thus Alexander himſelf was peremptorily denied by the pythia, or prieſteſs of Apollo, till ſhe was by downright force obliged to aſcend the tripos; when, being unable to reſiſt any longer, ſhe cried out, *Thou art invincible:* and theſe words were accepted inſtead of a farther oracle.

Of the ambiguity of oracles, the following, out of a great many examples, may be mentioned. Crœſus having received from the pythoneſs this anſwer, That by paſſing the river Halys, he would deſtroy a great empire; he underſtood it to be the empire of his enemy, whereas he deſtroyed his own.—The oracle conſulted by Pyrrhus gave him an anſwer, which might be equally underſtood of the victory of Pyrrhus, and the victory of the Romans his enemies:

Aio te, Æacida, Romanos vincere poſſe.

The equivocation lies in the conſtruction of the Latin tongue, which cannot be rendered in Engliſh.—The pythoneſs adviſed Crœſus to guard againſt the mule. The king of Lydia underſtood nothing of the oracle, which denoted Cyrus deſcended from two different nations; from the Medes, by Mandana his mother, the daughter of Aſtyages; and from the Perſians, by his father Cambyſes, whoſe race was by far leſs grand and illuſtrious.—Nero had for anſwer, from the oracle of Delphos, that ſeventy-three might prove fatal to him. He believed he was ſafe from all danger till that age; but, finding himſelf deſerted by every one, and hearing Galba proclaimed emperor, who was 73 years of age, he was ſenſible of the deceit of the oracle.

When men began to be better inſtructed by the lights philoſophy had introduced into the world, the falſe oracles inſenſibly loſt their credit. Chryſippus filled an entire volume with falſe or doubtful oracles. Oenomaus, to be revenged of ſome oracle that had deceived him, made a compilation of oracles, to ſhew their ridicule and vanity. Euſebius has preſerved ſome fragments of this criticiſm on oracles by Oenomaus. "I might (ſays Origen) have recourſe to the authority of Ariſtotle and the Peripatetics, to make the Pythoneſs much ſuſpected; I might extract from the writings of Epicurus and his ſectators an abundance of things to diſcredit oracles; and I might ſhew that the Greeks themſelves made no great account of them."

The reputation of oracles was greatly leſſened when they became an artifice of politics. Themiſtocles, with a deſign of engaging the Athenians to quit Athens, and to embark, in order to be in a better condition to reſiſt Xerxes, made the Pythoneſs deliver an oracle, commanding them to take refuge in wooden walls. Demoſthenes ſaid, that the Pythoneſs *Philippiſed;* to ſignify that ſhe was gained over by Philip's preſents.

The ceſſation of oracles is atteſted by ſeveral prophane authors; as Strabo, Juvenal, Lucan, and others. Plutarch accounts for the cauſe of it, either that the benefits of the Gods are not eternal as themſelves are; or that the genii, who preſided over oracles, are ſubject to death; or that the exhalations of the earth had been exhauſted. It appears that the laſt reaſon had been alleged in the time of Cicero, who ridicules it in his ſecond book of Divination, as if the ſpirit of prophecy, ſuppoſed to be excited by ſubterraneous effluvia, had evaporated by length of time, as wine or pickle by being long kept.

Suidas, Nicephorus, and Cedrenus, relate, that Auguſtus, having conſulted the oracle of Delphos, could obtain no other anſwer but this: "The Hebrew child whom all the Gods obey, drives me hence, and ſends me back to hell: get out of this temple without ſpeaking one word." Suidas adds, that Auguſtus dedicated an altar in the Capitol with this inſcription, "To the eldeſt Son of God." Notwithſtanding theſe teſtimonies, the anſwer of the oracle of Delphos to Auguſtus ſeems very ſuſpicious. Cedrenus cites Euſebius for this oracle, which is not now found in his works; and Auguſtus's peregrination into Greece was 18 years before the birth of Chriſt.

Suidas and Cedrenus give an account alſo of an ancient oracle delivered to Thulis, a king of Egypt, which they ſay is well authenticated. The king having conſulted the oracle of Serapis, to know if there ever was, or would be, one ſo great as himſelf, received this anſwer: "Firſt, God, next the Word, and the Spirit with them. They are equally eternal, and make but one, whoſe power will never end. But thou, mortal, go hence, and think that the end of the life of man is uncertain."

Van Dale, in his treatiſe of oracles, does not believe that they ceaſed at the coming of Chriſt. He relates ſeveral examples of oracles conſulted till the death of Theodoſius the Great. He quotes the laws of the emperors Theodoſius, Gratian, and Valentinian, againſt thoſe who conſulted oracles, as a certain proof that the ſuperſtition of oracles ſtill ſubſiſted in the time of thoſe emperors.

According to others, the opinion of thoſe who believe that the demons had no ſhare in the oracles, and that the coming of the Meſſiah made no change in them, and the contrary opinion of thoſe who pretend that the incarnation of the Word impoſed a general ſilence on all oracles, ſhould be equally rejected. They allege, that two ſorts of oracles ought to be diſtinguiſhed: the one dictated by the ſpirits of darkneſs, who deceived men by their obſcure and doubtful anſwers; the other, the pure artifice and cheat of the prieſts of falſe divinities. As to the oracles given out by demons, the reign of Satan was deſtroyed by the coming of the Saviour; truth ſhut the mouth of lies: but Satan continued his old craft among idolaters. All the devils were not forced to ſilence at the ſame time by the coming of the Meſſiah; it was on particular occaſions that the truth of Chriſtianity, and the virtue of Chriſtians, impoſed ſilence on the devils. St Athanaſius tells the Pagans, that they have been witneſſes themſelves that the ſign of the croſs puts the devils to flight, ſilences oracles, and diſſipates enchantments. This power of ſilencing oracles, and putting the devils to flight, is alſo atteſted by Arnobius, Lactantius, Prudentius, Minutius Felix, and ſeveral others. Their teſtimony is a certain proof that the coming of the Meſſiah had not impoſed a general ſilence on oracles.

Plutarch relates, that the pilot Thamus heard a voice in the air, crying out, "The great Pan is dead;" whereupon Euſebius obſerves, that the accounts of the death of the demons were frequent in the reign of Tiberius, when Chriſt drove out the wicked ſpirits.

The ſame judgment, it is ſaid, may be paſſed on oracles as on *poſſeſſions*. It was on particular occaſions, by the divine permiſſion, that the Chriſtians caſt out devils, or ſilenced oracles, in the preſence, and even by the confeſſion, of the Pagans themſelves. And thus it is we ſhould, it ſeems, underſtand the paſſages of St Jerom, Euſebius, Cyril, Theodoret, Prudentius, and other authors, who ſaid that the coming of Chriſt had impoſed ſilence on the oracles.

As to the ſecond ſort of oracles, which were pure artifices and cheats of the prieſts of falſe divinities, and which probably exceeded the number of thoſe that immediately proceeded from demons, they did not ceaſe till idolatry was aboliſhed, though they had loſt their credit for a conſiderable time before the coming of Chriſt. It was concerning this more common and general ſort of oracles that Minutius Felix ſaid, they began to diſcontinue their reſponſes, according as men began to be more polite. But, however decried oracles were, impoſtors always found dupes, the groſſeſt cheats having never failed.

Daniel diſcovered the impoſture of the prieſts of Bel, who had a private way of getting into the temple to take away the offered meats, and who made the king believe that the idol conſumed them.—Mundus, being in love with Paulina, the eldeſt of the prieſteſſes of Iſis, went and told her, that the god Anubis, being paſſionately fond of her, commanded her to give him a meeting. She was afterwards ſhut up in a dark room, where her lover Mundus, whom ſhe believed to be the god Anubis, was concealed. This impoſture having been diſcovered, Tiberius ordered thoſe deteſtable prieſts and prieſteſſes to be crucified, and with them Idea, Mundus's free-woman, who had conducted the whole intrigue. He alſo commanded the temple of Iſis to be levelled with the ground, and her ſtatue to be thrown into the Tiber; and, as to Mundus,

dus, he contented himſelf with ſending him into baniſhment.

Theophilus, biſhop of Alexandria, not only deſtroyed the temples of the falſe gods, but diſcovered the cheats of the prieſts, by ſhewing that the ſtatues, ſome of which were of braſs, and others of wood, were hollow within, and led into dark paſſages made in the wall.

Lucian, in diſcovering the impoſtures of the falſe prophet Alexander, ſays, that the oracles were chiefly afraid of the ſubtilties of the Epicureans and Chriſtians. The falſe prophet Alexander ſometimes feigned himſelf ſeized with a divine fury, and by means of the herb ſopewort, which he chewed, frothed at the mouth in ſo extraordinary a manner, that the ignorant people attributed it to the ſtrength of the god he was poſſeſſed by. He had long before prepared a head of a dragon made of linen, which opened and ſhut its mouth by means of a horſe-hair. He went by night to a place where the foundations of a temple were digging; and, having found water, either of a ſpring, or rain that had ſettled there, he hid in it a gooſe-egg, in which he had incloſed a little ſerpent that had been juſt hatched. The next day, very early in the morning, he came quite naked into the ſtreet, having only a ſcarf about his middle, holding in his hand a ſcythe, and toſſing about his hair as the prieſts of Cybele; then getting a-top of a high altar, he ſaid that the place was happy to be honoured by the birth of a god.—Afterwards, running down to the place where he had hid the gooſe-egg, and going into the water, he began to ſing the praiſes of Apollo and Æſculapius, and to invite the latter to come and ſhew himſelf to men. With theſe words, he dips a bowl into the water, and takes out a myſterious egg, which had a god incloſed in it; and when he had it in his hand, he began to ſay that he held Æſculapius. Whilſt all were eager to have a ſight of this fine myſtery, he broke the egg, and the little ſerpent ſtarting out, twiſted itſelf about his fingers.

Theſe examples ſhew clearly, that both Chriſtians and Pagans were ſo far agreed as to treat the *greater number* of oracles as purely human impoſtures.—That, in fact, ALL of them were ſo, will be concluded by thoſe who give equal credit to demoniacal *inſpiration*, and demoniacal *poſſeſſion*. See the article POSSESSION (*Demoniacal*).

ORAL, ſomething delivered by word of mouth, without being committed to writing; in which ſenſe we ſay oral law, oral tradition, &c.

ORANG OUTANG. See SIMIA.

ORANGE PEEL. See CITRUS and ORANGE-TREE.

ORAN, a very ſtrong and important town of Africa, in Barbary, and in the kingdom of Tremecen, with ſeveral forts, and an excellent harbour. It is ſeated partly on the ſide of a hill, and partly on a plain, about a ſtone-caſt from the ſea, almoſt oppoſite to Carthagena in Spain. It is about a mile and an half in circumference, and well fortified, but commanded by the adjacent hills. It was taken by the Spaniards in 1509, and retaken by the Algerines in 1708; but in 1732 the Spainards become maſters of it, and have continued ſo ever ſince. E. Long. 0. 5. N. Lat. 37. 40.

ORANGE, a famous city, and capital of a province of the ſame name, united to Dauphiny, with a univerſity and a biſhop's ſee. It is ſeated in a fine large plain, watered by a vaſt number of little rivulets on the eaſt ſide of the river Rhone. It is a very large ancient place, and was conſiderable in the time of the Romans, who adorned it with ſeveral buildings, of which there are ſtill ſome ruins left, particularly of an amphitheatre, and a triumphal arch, which is almoſt entire. This town was formerly much larger than it is at preſent, as appears from the traces of the ancient walls. The wall was in 1682 entirely demoliſhed by order of Lewis XIV. and the inhabitants were expoſed to the fury of the ſoldiers. The town was reſtored to king William by the treaty of Ryſwick; but after his death the French took it again, and expelled the proteſtant inhabitants. By the treaty of Utrecht it was confirmed to the crown of France, though the title is ſtill retained in the houſe of Naſſau. The principality is a very ſmall diſtrict, it being only twelve miles in length and nine in breadth, and the revenue amounted to about 5000 l. a-year. The country is pleaſant, and abounds with corn and fruit, but is expoſed to violent winds. E. Long. 4. 51. N. Lat. 44. 21.

ORANGE-TREE, in botany. See the article CITRUS.—Orange-flowers are juſtly eſteemed one of the fineſt perfumes; and though little uſed in medicine, yet the water diſtilled from them is accounted ſtomachic, cordial, and carminative. The fruit is cooling, and good in feveriſh diſorders, and particularly in diarrhœas. Orange-peel is an agreeable aromatic, proper to repair and ſtrengthen the ſtomach, and give a very grateful flavour to any infuſions or tinctures into whoſe compoſitions they enter. It is particularly uſeful in preparations of the bark; gives an agreeable warmth to the infuſion; and, according to Dr Percival, conſiderably increaſes its virtue.

ORATION, in rhetoric, a ſpeech or harangue, compoſed according to the rules of oratory, but ſpoken in public. Orations may be reduced to three kinds, viz. the demonſtrative, deliberative, and judicial. To the demonſtrative kind belong panegyrics, genethliaca, epithalamia, congratulations, &c. To the deliberative kind belong perſuaſion, exhortation, &c. And to the judicial kind belong accuſation, confutation, &c.

ORATORIO, in the Italian muſic, a ſort of ſacred drama of dialogues; containing recitativos, duettos, trios, ritornellos, choruſes, &c. The ſubjects of thoſe pieces are uſually taken from ſcripture, or the life of ſome ſaint, &c. The muſic for the oratorios ſhould be in the fineſt taſte and beſt choſen ſtrains. Theſe oratorios are greatly uſed at Rome in the time of lent, and of late in England.

O R A T O R Y;

The art of ſpeaking well upon any ſubject, in order to perſuade.

INTRODUCTION.

§ 1. *Of the Riſe and Progreſs of Oratory.*

THE invention of oratory is by the Egyptians, and the fables of the poets, aſcribed to Mercury. And it is well known, that the Greeks made their deities the authors likewiſe of other arts, and ſuppoſed that they preſided over them. Hence they gave Mercury the titles of Λογιος and Ἑρμης, both which names come words that ſignify "to ſpeak." And Ariſtides calls eloquence *the gift of Mercury;* and for the ſame reaſon anciently the tongue was conſecrated to him. He was likewiſe ſaid to be the interpreter or meſſenger of the gods; which office very well ſuited him, as he excelled in eloquence. Hence we read in the Sacred Writings, that when the people of Lyſtra took Barnabas and Paul for gods in human ſhape, becauſe of that ſudden and ſurpriſing cure which was wrought upon the lame man, they called Barnabas *Jupiter*, and Paul *Mercury;* for this reaſon, as the inſpired writer tells us, 'becauſe he was the chief ſpeaker,' that is (as the ſpectators then thought) the interpreter or ſpokeſman of Barnabas.

But to paſs over theſe fictions of the heathen deities, let us hear what Quintilian ſays of the *origin* of this art; who ſeems to give a very probable account of it in the following paſſage. 'The faculty of ſpeech (ſays he) we derive from nature; but the art from obſervation. For as in phyſic, men, by ſeeing that ſome things promote health and others deſtroy it, formed the art upon thoſe obſervations; in like manner, by perceiving that ſome things in diſcourſe are ſaid to advantage, and others not, they accordingly marked thoſe things, in order to imitate the one, and avoid the other. They alſo added ſome things from their own reaſon and judgment, which being confirmed by uſe, they began to teach others what they knew themſelves.' But no certain account can be given when, or by whom, this method of obſervation firſt began to take place. And Ariſtotle ſuppoſes, not without reaſon, that the firſt lineaments of the art were very rude and imperfect. Pauſanias, indeed, in his *Deſcription of Greece*, tells us, that Pittheus, the uncle of Theſeus, taught it at Trezene a city of Peloponneſus, and wrote a book concerning it; which he read himſelf, as it was publiſhed by one of Epidaurus. But as Pittheus lived above 1000 years before Pauſanias, who flouriſhed in the time of the emperor Hadrian, ſome are of opinion he might be impoſed upon by the Epidaurian, who publiſhed this book under the name of *Pittheus*. But be that as it will, it is very reaſonable to believe, that the Greeks had the principles of this art ſo early as the time of Pittheus. For Theſeus his nephew lived not long before the taking of Troy, which, according to Sir Iſaac Newton, happened 904 years before the birth of Chriſt; at which time Cicero thought it was in much eſteem among them. 'Homer (ſays he) would never have given Ulyſſes and Neſtor in the Trojan wars ſo great commendations on account of their ſpeeches (to one of whom he attributes force, and to the other ſweetneſs of expreſſion) if eloquence had not in thoſe times been in great repute.' And leſt any one ſhould imagine, that in thoſe days they made uſe only of ſuch helps as nature and practice could afford them; the ſame poet informs us, that Peleus ſent Phenix with his ſon Achilles to the Trojan war, to inſtruct him not only in the art of war, but likewiſe of eloquence. But who were the profeſſors of this art for ſome ages following, is not known. For Quintilian ſays, that afterwards Empedocles is the firſt upon record, who attempted any thing concerning it. And he, by Sir Iſaac Newton's account, flouriſhed about 500 years after Troy was taken. At which time, as Cicero obſerves, men being now ſenſible of the powerful charms of oratory, and the influence it had upon the mind, there immediately aroſe ſeveral maſters of it; the chief of whom are mentioned by Quintilian, who tells us, that 'the oldeſt writers upon this art are Corax and Tiſias, both of Sicily. After them came Gorgias of Leontium in the ſame iſland, who is ſaid to have been the ſcholar of Empedocles, and by reaſon of his great age (for he lived to be 109 years old) had many cotemporaries. Thraſymachus of Chalcedon, Prodicus of Cea, Protagoras of Abdera, Hippias of Elis, and Alcidamus of Elea, lived in his time; as likewiſe Antiphon, who firſt wrote orations, and alſo upon the art, and is ſaid to have ſpoken admirably well in his own defence; and beſides theſe, Polycrates, and Theodore of Byzantium.' Theſe perſons contributed different ways towards the improvement of the art. Corax and Tiſias gave rules for methodizing a diſcourſe, and adjuſting its particular parts; as may be conjectured from Cicero's account of them, who ſays, 'Though ſome had ſpoke well before their time, yet none with order and method.' But Gorgias ſeems to have excelled all the reſt in fame and reputation: for he was ſo highly applauded by all Greece, that a golden ſtatue was erected to him at Delphos, which was a diſtinguiſhing honour conferred upon him only. And he is ſaid to have been ſo great a maſter of oratory, that in a public aſſembly he would undertake to declaim immediately upon any ſubject propoſed to him. He wrote, as Cicero informs us, in the demonſtrative or laudatory way; which requires moſt of the ſublime, and makes what Diodorus Siculus ſays of him the more probable, that 'he firſt introduced the ſtrongeſt figures, members of periods oppoſite in ſenſe, of an equal length, or ending with a like ſound, and other ornaments of that nature.' And hence thoſe figures, which give the greateſt force and luſtre to a diſcourſe, were anciently called by his name. Cicero tells us further, that Thraſymachus and Gorgias were the firſt who introduced numbers into proſe, which Iſocrates afterwards brought to perfection. Quintilian likewiſe mentions Protagoras, Gorgias, Prodicus, and Thraſymachus, as the firſt who treated of common-places, and ſhewed the uſe of them for the invention of arguments. Nor muſt we omit Plato, whoſe elegant dialogue upon this ſubject is ſtill extant, which he entitles

Gorgias. For though he does not lay down the common rules of the art; yet he very well explains the nature of it, and maintains its true end and uſe againſt the generality of its profeſſors, who had greatly perverted the original deſign of it. Thus by the ſtudy and induſtry of ſo many ingenious and great men, the art of oratory was then carried to a conſiderable height among the Grecians. Though many of thoſe, who profeſſed it in thoſe times, employed their ſkill rather to promote their own reputation and applauſe, than to ſerve the real intereſts of truth and virtue. 'For they propoſed in an arrogant manner (as Cicero ſays) to teach how a bad cauſe might be ſo managed, as to get the better of a good one.' That is, they would undertake to charm the ears and ſtrike the paſſions of their hearers in ſo powerful a manner, by ſophiſtical reaſonings, turns of wit, and fine language, as to impoſe falſehood upon them for truth; than which nothing could be either more diſingenuous in itſelf, or prejudicial to ſociety.

But thoſe who ſucceeded them, ſeem to have conſulted better, both for their own honour, and that of their profeſſion. Iſocrates was the moſt renowned of all Gorgias's ſcholars, whom Cicero frequently extols with the higheſt commendations, as the greateſt maſter and teacher of oratory; 'whoſe ſchool (as he ſays) like the Trojan horſe, ſent forth abundance of great men.' Ariſtotle was chiefly induced to engage in this province from an emulation of his glory; and would often ſay in a verſe of Sophocles, ſomewhat varied to his purpoſe,

> To be ſilent it is a ſhame;
> While Iſocrates gets ſuch fame.

Quintilian ſays they both wrote upon the art, though there is no ſyſtem of the former now extant. But that of Ariſtotle is eſteemed the beſt and moſt complete of any in the Greek language. In this age the Grecian eloquence appeared in its higheſt perfection. Demoſthenes was an hearer both of Iſocrates and Plato, as alſo of Iſæus (ten of whoſe orations are yet extant); and by the aſſiſtance of a ſurpriſing genius, joined with indefatigable induſtry, made that advantage of their precepts, that he has been always eſteemed by the beſt judges the prince of Grecian orators. His great adverſary and rival Æſchines, after his baniſhment is ſaid to have gone to Rhodes, and employed his time there in teaching of rhetoric. Theodectes and Theophraſtus, both of them ſcholars of Ariſtotle, imitated their maſter in writing upon the art. And from that time the philoſophers, eſpecially the ſtoics and peripatetics, applied themſelves to lay down the rules of oratory; which Socrates had before ſeparated from the province of a philoſopher. And there is yet preſerved a treatiſe upon this ſubject, which ſome have aſcribed to Demetrius Phalereus the peripatetic, and ſcholar of Theophraſtus, though others more probably to Dionyſius of Halicarnaſſus. Quintilian mentions ſeveral other famous rhetoricians in the following ages, who were likewiſe writers; as Hermagoras, Athenæus, Apollonius Molon, Areus Cæcilius, Dionyſius of Halicarnaſſus, Apollonius of Pergamus, and Theodore of Gadara. But of theſe nothing now remains upon the ſubject of oratory, except ſome tracts of Dionyſius, who flouriſhed in the reign of Auguſtus Cæſar. Nor have there been wanting ſome eminent writers of this kind among the Greeks ſince the time of Quintilian; two of whom we cannot omit to mention, Hermogenes, and Longinus the author of the incomparable treatiſe *Of the Sublime*, a book which can ſcarce be too much commended or too often read.

It was long before Rome received this art, and not without difficulty at firſt. The reaſon was, becauſe the Romans were for ſeveral ages wholly addicted to military affairs, and to enlarge their territories; ſo that they not only neglected to cultivate learning, but thought the purſuit of it a thing of ill tendency, by diverting the minds of their youth from the cares and toils of war, to a more ſoft and indolent kind of life. Therefore ſo late as the year of their city 592, when by the induſtry of ſome Grecians the liberal arts began to flouriſh in Italy, a decree paſſed the ſenate, by which all philoſophers and rhetoricians were ordered to depart out of Rome. But in a few years after, when Carneades, Critolaus, and Diogenes, who were not only philoſophers but orators, came ambaſſadors from Athens to Rome; the Roman youth were ſo charmed with the eloquence of their harangues, that they could no longer be ſtopt from purſuing the ſtudy of oratory. And by a further acquaintance with the Greeks, it ſoon gained ſuch eſteem, that perſons of the firſt quality employed their time and pains to acquire it. And a young gentleman, who was ambitious to advance himſelf in the ſervice of his country, could have little hopes of ſucceſs, unleſs he had laid the foundation of his future proſpects in that ſtudy.

Seneca tells us, that Lucius Plotius, a Gaul, was the firſt who taught the art of oratory at Rome in Latin; which Cicero ſays, was while he was a boy; and when the moſt ſtudious perſons went to hear him, he lamented that he could not go with them; being prevented by the regard he paid to the opinion of ſome of his friends, who thought that greater improvements were made by exerciſes in the Greek language under Grecian maſters. Seneca adds, that this profeſſion continued for ſome time in the hands of freedmen; and that the firſt Roman who engaged in it was Blandus of the equeſtrian order, who was ſucceeded by others; ſome of whoſe lives are yet extant, written by Suetonius, as many of the Grecians are by Philoſtratus and Eunapius. Quintilian likewiſe gives us the names of thoſe among the Romans, who wrote upon the art. 'The firſt (ſays he) as far as I can learn, who compoſed any thing upon this argument, was M. Cato the cenſor. After him Anthony the orator began upon the ſubject, which is the only work he has left, and that imperfect. Then followed ſome of leſs note. But he who carried eloquence to its higheſt pitch among us, was Cicero; who has likewiſe by his rules given the beſt plan both to practiſe and teach the art. After whom modeſty would require us to mention no more, had he not told us himſelf, that his books of rhetoric ſlipt out of his hands, while he was but a youth. And thoſe leſſer things, which many perſons want, he has purpoſely omitted in his diſcourſes of oratory. Cornificius wrote largely upon the ſame ſubject; Stertinius and Gallio the father, each of them ſomething. But Celſus and Lenas were more accurate than Gallio; and in our times Virginius, Pliny, and Rutilius. And there are at this day ſome celebrated authors of the ſame kind, who, if they had taken in every thing, might have ſaved my pains.' Time has ſince deprived us of moſt of the writers mentioned here by Quintilian. But we have the leſs reaſon to regret this loſs, ſince it has preſerved to us Cicero's treatiſes upon this ſubject; which we may well ſuppoſe to have been chiefly owing to their own excellency, and the great eſteem they have always had in the world. Beſides his *Two books of Invention*, which Quintilian here calls his *Books of Rhetoric*, there are extant of his, *Three books of an Orator*; one *Of famous Orators*; and another, which is called *The Orator*; as alſo his *Topics*, a preface *Concerning the beſt ſort of Orators*, and a treatiſe *Of the parts of Oratory*. Each of which treatiſes, whether we regard the juſtneſs and delicacy of the thoughts, the uſefulneſs of the rules, or the elegance and beauty of the ſtyle, deſerve to be frequently peruſed by all who are lovers of eloquence. For who can be thought ſo well qualified to give the rules of any art, as he who excelled all mankind in the practice of them? But thoſe *Four books to Herennius*, which are publiſhed among Cicero's works, ſeem with good reaſon to be attributed to Cornificius, whom Quintilian here mentions. And Celſus is by ſome affirmed to have taught oratory, whom he alſo places among the rhetoricians, and whoſe *Eight books of Medicine* are yet extant, written in ſo beautiful a ſtyle as plainly ſhews him to be a maſter of eloquence. But Quintilian himſelf outdid all who went before him in diligence and accuracy as a writer. His *Inſtitutions* are ſo comprehenſive, and written with ſuch great exactneſs and judgment, that they are generally allowed to be the moſt perfect work of the kind. With this excellent author we ſhall finiſh the account of the Latin rhetoricians.

There were indeed ſome others in the following ages, whoſe works are yet extant; but as they contain nothing of moment, which is not to be found in thoſe already mentioned, we ſhall forbear to name them. Much leſs ſhall we deſcend to that numerous body of writers, who ſince the revival of learning have treated upon this ſubject, for the ſame reaſon. And a very good judge * has not long ſince given it as his opinion, that the method of forming the beſt ſyſtem of oratory, is to collect it from the fineſt precepts of Ariſtotle, Cicero, Quintilian, Longinus, and other celebrated authors; with proper examples taken from the choiceſt parts of the pureſt antiquity. And this is the method attempted to be purſued in the following treatiſe.

* Archbp. Cam- y, *Lett.* 113.

§ 2. *Of the Nature of Oratory.*

The terms *rhetoric* and *oratory*, having no other difference but that one is taken from the Greek language and the other from the Latin, may be uſed promiſcuouſly; but the caſe is not the ſame with reſpect to the words *rhetorician* and *orator*. For although the Grecians uſed the former, both to expreſs thoſe who taught the art, and thoſe who practiſed it; yet the Romans afterward, when they took that word into their language, confined it to the teachers of the art, and called the reſt *orators*. And there ſeems to have been a ſufficient reaſon for this diſtinction, ſince the art was the ſame in both, and might therefore go by either name; but the different province of rhetoricians and orators made it not improper they ſhould be called by different names. Beſides, anciently, before rhetoric was made a ſeparate and diſtinct art from philoſophy, the ſame perſons taught both. And then they were called not only *rhetoricians*, but *ſophiſts*. But becauſe they often employed their art rather to vindicate what was falſe and unjuſt, than to ſupport truth and virtue: this diſingenuous conduct, by which they frequently impoſed upon weak minds, brought a diſcredit both upon themſelves and their profeſſion. And therefore the name *ſophiſt*, or *ſophiſter*, has been more generally uſed in an ill ſenſe, to ſignify one ſkilled rather in the arts of cavilling, than qualified to ſpeak well and accurately upon any ſubject.

It is not neceſſary to uſe many words, to prove that oratory is an art. For it is compriſed under certain rules, agreeable to reaſon, delivered in a regular method, and ſuited to attain the end it propoſes; which are characters ſufficient to denominate it an art. Indeed the caſe is the ſame here, as in moſt other things, that a good genius is of itſelf more ſerviceable, than the moſt exact acquaintance with all the rules of art, where that is wanting. But it is ſufficient that art help nature, and carry it farther than it can otherwiſe advance without it. And he who is deſirous to gain the reputation of a good orator, will find the aſſiſtance of both very neceſſary. Some perſons have thought, that many of the common ſyſtems written upon the ſubject of oratory have been attended with this inconvenience, that by burdening the mind with too great a number of rules about things of leſs importance, they have oftentimes rather diſcouraged than promoted the ſtudy of eloquence. This undoubtedly is extreme which ſhould be always carefully avoided. But however, an indifferent guide in a ſtrange road is better than none at all. It may be worth while to hear Quintilian's opinion upon this head. 'I would not (ſays he) have young perſons think they are ſufficiently inſtructed, if they have learned one of thoſe compends which are commonly handed about, and fancy themſelves ſafe in the decrees, as it were, of theſe technical writers. The art of ſpeaking requires much labour, conſtant ſtudy, a variety of exerciſe, many trials, the greateſt prudence, and readineſs of thought. However, theſe treatiſes are uſeful, when they ſet you in a plain and open way, and do not confine you to one narrow tract, from which he who thinks it a crime to depart muſt move as ſlowly as one that walks upon a rope.' We ſee he is not for having us confine ourſelves too cloſely to ſyſtems, though he thinks they are of ſervice at firſt, till uſe and experience render them leſs neceſſary.

The buſineſs of oratory is to teach us to ſpeak well; which, as Cicero explains it, is to ſpeak *juſtly*, *methodically*, *floridly*, and *copiouſly*.

Now, in order to ſpeak *juſtly*, or pertinently, a perſon muſt be maſter of his ſubject, that he may be able to ſay all that is proper, and avoid whatever may appear foreign and trifling. And he muſt clothe his thoughts with ſuch words and expreſſions, as are moſt ſuited to the nature of the argument, and will give it the greateſt force and evidence.

And as it teaches to ſpeak juſtly, ſo likewiſe *methodically*. This requires, that all the parts of a diſcourſe be placed in their proper order, and with ſuch juſt connection, as to reflect a light upon each other, and thereby to render the whole both clear in itſelf, and eaſy to be retained. But the ſame method is not proper for all diſcourſes. And very frequently a different manner is convenient in handling the ſame ſubject. For it is plain, that art, as well as nature, loves variety; and it diſcovers the ſpeaker's judgment, when the diſpoſition of his diſcourſe is ſo framed, as to appear eaſy and natural, rather than the effect of induſtry and labour.

To ſpeak *floridly*, is ſo peculiar a property of this art, that ſome have wholly confined it to the pomp and ornaments of language. But that it extends farther, and reſpects things as well as words, we ſhall have occaſion to ſhew hereafter. It contains indeed the whole ſubject of elocution, but does not wholly conſiſt in it. True and ſolid eloquence requires not only the beauties and flowers of language; but likewiſe the beſt ſenſe and cleareſt reaſoning. Beſides, rhetoric gives rules for the ſeveral ſorts of ſtyle, and directs the uſe of them agreeably to the nature of the ſubject.

But the force of oratory appears in nothing more, than a *copiouſneſs* of expreſſion, or a proper manner of enlargement, ſuited to the nature of the ſubject; which is of great uſe in perſuaſion, and forms the laſt property, required by Cicero, of ſpeaking well. A ſhort and conciſe account of things is often attended with obſcurity, from an omiſſion of ſome neceſſary circumſtances relating to them. Or, however, where that is not the caſe, yet for want of proper embelliſhments to enliven the diſcourſe, and thereby to excite and fix the hearers attention, it is apt to ſlip through their minds without leaving any impreſſion. But where the images of things are drawn in their full proportion, painted in their proper colours, ſet in a clear light, and repreſented in different views, with all the ſtrength and beauties of eloquence, they captivate the minds of the audience with the higheſt pleaſure, engage their attention, and by an irreſiſtible force move and bend them to the deſign of the ſpeaker.

The principal end and deſign of oratory is to perſuade. For which reaſon it is frequently called the *art of perſuaſion*. Indeed the orator has often other ſubordinate views; as when he endeavours either to delight his hearers with what is pleaſant and agreeable, or to conciliate their good opinion by a ſmooth and artful addreſs: but ſtill both theſe are in order to perſuade and excite them to action.

And while the orator employs his art in purſuing only thoſe ends for which it was at firſt deſigned, the perſuading men to good and virtuous actions, and diſſuading them from every thing that is ill and vicious; nothing can be more commendable in itſelf, or uſeful to human ſocieties.

§ 3. *Of the Diviſion of Oratory.*

ORATORY conſiſts of four parts; *invention*, *diſpoſition*, *elocution*, and *pronunciation*. This will appear by conſidering the nature of each of them, and what it contributes in forming an orator. Every one who aims to ſpeak well and accurately upon any ſubject, does naturally in the firſt place inquire after and purſue ſuch thoughts as may ſeem moſt proper to explain and illuſtrate the thing upon which he deſigns to diſcourſe. And if the nature of it requires that he ſhould bring reaſons to confirm what he ſays, he not only ſeeks the ſtrongeſt, and ſuch as are like to be beſt received; but alſo prepares to anſwer any thing which may be offered to the contrary. This is *invention*. After this he deliberates with himſelf in what method to diſpoſe of thoſe things which have occurred to his mind, that they may appear in the plaineſt light, and not loſe their force by diſorder and confuſion. This is the buſineſs of *diſpoſition*. His next concern is to give his thoughts an agreeable dreſs; by making choice of the fitteſt words, cleareſt expreſſions, ſmooth and harmonious periods, with other ornaments of ſtyle, as may beſt ſuit the nature of his ſubject, brighten his diſcourſe, and render it moſt entertaining to his hearers. And this is called *elocution*. The laſt thing he attends to, is to deliver what he has thus compoſed, with a juſt and agreeable *pronunciation*. And daily experience convinces us, how much this contributes both to engage the attention, and impreſs what is ſpoken upon the mind. This then is the method to which nature directs, in order to qualify ourſelves for diſcourſing to the beſt advantage: Though by cuſtom and habit theſe things become ſo familiar to us, that we do not always attend to them ſeparately in their natural order. However, it is the buſineſs of art to follow nature, and to treat of things in that manner which ſhe dictates.

PART I. OF INVENTION.

CHAP. I. *Of Invention in general; and particularly of Common Places, and State of a Cauſe.*

INVENTION, conſidered in general, is the diſcovery of ſuch things as are proper to perſuade. And in order to attain this end, the orator propoſes to himſelf three things: To prove or illuſtrate the ſubject upon which he treats; to conciliate the minds of his hearers; and to engage their paſſions in his favour. And as theſe require different kinds of arguments or motives, invention furniſhes him with a ſupply for each of them, as will be ſhewn in their order.

An argument, as defined by Cicero, is a reaſon, which induces us to believe, what before we doubted of.

And as different kinds of diſcourſes require different arguments, rhetoricians have conſidered them two ways; in general, under certain heads, as a common fund for all ſubjects; and in a more particular manner, as they are ſuited to *demonſtrative*, *deliberative*, or *judicial* diſcourſes. At preſent we ſhall treat only upon the former of theſe. And now, that one thing may receive proof and confirmation from another, it is neceſſary that there be ſome relation between them; for all things are not equally adapted to prove one another. Thus, in meaſuring the quantity of two things which we would ſhew to be either equal or unequal, if they are of ſuch a nature that one cannot be applied to the other, then we take a third thing, which may be applied to them both; and that muſt be equal at leaſt to one of the two, which if applied to the other, and found equal to that alſo, we preſently conclude that thoſe two things are equal; but if it be unequal to the other, we ſay that thoſe two things are unequal. Becauſe it is the certain and known property of all quantities, that whatſoever two things are equal to a third, are equal to one another; and where one of any two things is equal to a third, and the other unequal, thoſe two things are unequal to one another. What has been ſaid of quantities, will hold true in all other caſes, that ſo far as any two things or ideas agree to a third, ſo far they agree to one another. So likewiſe, on the contrary, as far as one of any two things or ideas does agree to a third, and the other does not, ſo far they diſagree with one another; in which reſpect, one of them cannot be truly affirmed of the other. Since, therefore, in every propoſition, one thing is ſpoken of another, if we would find out whether the two ideas agree to each other or not, where this is not evident of itſelf, we muſt find out ſome third thing, the idea of which agrees to one of them; and then that being applied to the other, as it does agree or diſagree with it, ſo we may conclude, that the two things propoſed do agree or diſagree with one another. This will be made more clear by an example or two. Should it be inquired, *Whether virtue is to be loved;* the agreement between virtue and love might be found by comparing them ſeparately with happineſs, as a common meaſure to both. For ſince the idea of happineſs agrees to that of love, and the idea of virtue to that of happineſs; it follows, that the ideas of virtue and love agree to one another: and therefore it may be affirmed, *That virtue is to be loved.* But on the contrary, becauſe the idea of miſery diſagrees with that of love, but the idea of vice agrees to that of miſery, the two ideas of vice and love muſt conſequently diſagree with one another; and therefore it would be falſe to aſſert, *That vice is to be loved.* Now, this third thing logicians call the *medium,* or *middle term,* becauſe it does as it were connect two extremes; that is, both parts of a propoſition. But rhetoricians call it an *argument,* becauſe it is ſo applied to what was before propoſed, as to become the inſtrument of procuring our aſſent to it. Thus far as to the nature and uſe of arguments. We ſhall next explain by what methods they are to be ſought.

A lively imagination, and readineſs of thought, are undoubtedly a very great help to invention. Some perſons are naturally endued with that quickneſs of fancy, and penetration of mind, that they are ſeldom at a loſs for arguments either to defend their own opinions, or to attack their adverſaries. However, theſe things being the gift of nature, and not to be gained by art, do not properly fall under our preſent conſideration.

It will be readily granted, that great learning and extenſive knowledge are a noble fund for invention. An orator therefore ſhould be furniſhed with a ſtock of important truths, ſolid maxims of reaſon, and a variety of knowledge, collected and treaſured up both from obſervation, and a large acquaintance with the liberal arts; that he may not only be qualified to expreſs himſelf in the moſt agreeable manner, but likewiſe to ſupport what he ſays with the ſtrongeſt and cleareſt arguments.

2 But becauſe all are not born with a like happy genius, and have not the ſame opportunity to cultivate their minds with learning and knowledge; and becauſe nothing is more difficult than to dwell long upon the conſideration of one thing, in order to find out the ſtrongeſt arguments which may be offered for and againſt it; upon theſe accounts, art has preſcribed a method to leſſen, in ſome meaſure, theſe difficulties, and help every one to a ſupply of arguments upon any ſubject. And this is done by the contrivance of *common places,* which Cicero calls the *ſeats* or *heads of arguments,* and by a Greek name *topics.* They are of two ſorts, *internal* and *external.*

3 I. *Internal topics.* Though things, with regard to their nature and properties, are exceedingly various, yet they have certain common relations, by means whereof the truth of what is either affirmed or denied concerning them in any reſpect may be evinced. The ancient Greek rhetoricians therefore reduced theſe relations to ſome general heads, which are termed *common places;* becauſe the reaſons or arguments ſuited to prove any propoſition, are repoſited in them, as a common fund or receptacle. And they are called *internal heads,* becauſe they ariſe from the ſubject upon which the orator treats; and are therefore diſtinguiſhed from others named *external,* which he fetches from without, and applies to his preſent purpoſe, as will be ſhewn hereafter. Cicero and Quintilian make them 16; three of which comprehend the whole thing they are brought to prove, namely, *definition, enumeration,* and *notation:* of the remaining 13, ſome contain a part of it, and the reſt its various properties and circumſtances, with other conſiderations relating to it; and theſe are, *genus, ſpecies, antecedents, conſequents, adjuncts, conjugates, cauſe, effect, contraries, oppoſites, ſimilitude, diſſimilitude,* and *compariſon.*

Definition explains the nature of the thing defined, and ſhews what it is. And to whatſoever the definition agrees, the thing defined does ſo likewiſe. If therefore Socrates be a rational creature, he is a man; becauſe it is the definition of a man, that he is a rational creature.

Enumeration takes in all the parts of a thing. And from this we prove, that what agrees to all the parts, agrees to the whole; and what does not agree to any one or more parts, does not agree to the whole: As when Cicero proves to Piſo that all the Roman ſtate hated him, by enumerating the ſeveral ranks and orders of Roman citizens who all did ſo.

Notation, or etymology, explains the meaning or ſignification of a word. From which we reaſon thus: "If he cannot pay his debts, he is inſolvent;" for that is the meaning of the word *inſolvent.*

Genus is what contains under it two or more ſorts of things, differing in nature. From this head logicians reaſon thus: "Becauſe every animal is mortal, and man is an animal, therefore man is mortal." But orators make a further uſe of this argument, which they call *aſcending from the hypotheſis to the theſis;* that is, from a particular to a general: As ſhould a perſon, when ſpeaking in praiſe of juſtice, take occaſion from thence to commend and ſhew the excellency of virtue in general, with a view to render that particular virtue more amiable. For ſince every ſpecies contains in it the whole nature of the genus to which it relates, beſides what is peculiar to itſelf, whereby it is diſtinguiſhed from it; what is affirmed of the genus, muſt of neceſſity be applicable to the ſpecies.

Species is that which comprehends under it all the individuals of the ſame nature. From hence we may argue, "He is a man, therefore he has a rational ſoul." And orators ſometimes take occaſion from this head to deſcend from the theſis to the hypotheſis: that is, in treating upon what is more general, to introduce ſome particular contained under it, for the greater illuſtration of the general.

Antecedents are ſuch things, as, being once allowed, others neceſſarily, or very probably, follow. From this head an inſeparable property is proved from its ſubject: as, It is material, and therefore corruptible.

Conſequents are ſuch things, as being allowed, neceſſarily, or very probably infer their antecedents. Hence the ſubject is proved from an inſeparable property in this manner: It is corruptible, and therefore material.

Adjuncts are ſeparable properties of things, or circumſtances that attend them. Theſe are very numerous, and afford a great variety of arguments, ſome of which uſually occur in every diſcourſe. They do not neceſſarily infer their ſubject; but, if fitly choſen, render a thing credible, and are a ſufficient ground for aſſent. The way of reaſoning from them we ſhall ſhew preſently.

Conjugates are words deduced from the ſame origin with that of our ſubject. By theſe the habit is proved from its acts: as, He who does juſtly is juſt. He does not act wiſely, therefore he is not wiſe. But this inference will not hold, unleſs the actions appear continued and conſtant.

A *cauſe* is that, by the force of which a thing does exiſt. There are four kinds of cauſes, matter, form, efficient, and end, which afford a great variety of arguments. The way of reaſoning from them is to infer the effect from the cauſe: as, Man is endued with reaſon, therefore he is capable of knowledge.

An *effect* is that which ariſes from a cauſe, therefore the cauſe is proved by it: as, He is endued with knowledge, therefore with reaſon.

Contraries are things, which under the ſame genus, are at the utmoſt diſtance from each other. So that what we grant to the one, we utterly deny the other: as, Virtue ought to be embraced, therefore vice ſhould be avoided.

Oppoſites are ſuch things, which, though repugnant to each other, yet are not directly contradictory: as, To love and to injure, to hate and to commend. They differ from contraries in this, that they do not abſolutely exclude one another. An argument is drawn from things repugnant, thus: He will do a man a miſchief, therefore he does not love him. He loves a man, therefore he will not reproach him.

Similitude is an agreement of things in quality. Thus Cicero proves, that pernicious citizens ought to be taken out of the ſtate; by the likeneſs they bear to corrupted members, which are cut off to prevent further damage to the body.

Diſſimilitude is a diſagreement of things in quality. From this head Cicero ſhews the preference of his own exile to Piſo's government of Macedonia; by the difference between their conduct, and the people's eſteem of them.

Compariſon is made three ways: for either a thing is compared with a greater, with a leſs, or with its equal. This place, therefore, differs from that of ſimilitude on this account, that the quality was conſidered in that, but here the quantity. An argument from the greater is thus drawn: If five legions could not conquer the enemy, much leſs will two.

4 We ſhall juſt give one example of the manner of reaſoning from theſe heads, whereby the uſe of them may further appear. If any one, therefore, ſhould have endeavoured to perſuade Cicero not to accept of his life upon the condition offered him by Antony, That he would burn his Philippic orations which had been ſpoken againſt him, he might be ſuppoſed to uſe ſuch arguments as theſe; partly taken from the adjuncts of Cicero, partly from thoſe of Antony, and partly from the thing itſelf. And firſt with regard to Cicero, it might be ſaid, That ſo great a man ought not to purchaſe his life at ſo dear a price as the loſs of that immortal honour which by ſo great pains and labour he had acquired. And this might be confirmed by another argument, That now he was grown old, and could not expect to live much longer. And from the character of Antony he might argue thus: That he was very crafty and deceitful; and only deſigned, by giving him hopes of life, to have the Philippics firſt burnt, which otherwiſe he knew would tranſmit to poſterity an eternal brand of infamy upon him; and then he would take off the author. And this might be ſhewn by compariſon. For ſince he would not ſpare others, who had not ſo highly exaſperated him, and from whom he had not ſo much to fear; certainly he would not forgive Cicero, ſince he knew well enough, that ſo long as he lived, he himſelf could never be in ſafety. And, laſtly, an argument might alſo be fetched from the nature of the thing itſelf in the following manner: That Cicero by this action would ſhamefully betray the ſtate, and the cauſe of liberty, which he had through his whole life moſt courageouſly defended, with ſo great honour to himſelf, and advantage to the public. Upon ſuch an account, a perſon might have uſed theſe or the like arguments with Cicero, which ariſe from the forementioned heads.

From this account of common places, it is eaſy 5—(18 to conceive what a large field of diſcourſe they open to the mind upon every ſubject. Theſe different conſiderations furniſh out a great number and variety of arguments, ſufficient to ſupply the moſt barren invention. He can never be at a loſs for matter, who conſiders well the nature of his ſubject, the parts of which it conſiſts, the circumſtances which attend it, the cauſes from whence it ſprings, the effects it produces, its agreement, diſagreement, or repugnancy to other things; and in like manner carries it through all the remaining heads. But although this method will aſſiſt us very much to enlarge upon a ſubject, and place it in different views; yet a prudent man is not ſo deſirous to ſay a great deal, as to ſpeak to the purpoſe; and therefore will make choice of proper arguments, and ſuch only as have a direct tendency to confirm or illuſtrate his ſubject. And for this end, it is neceſſary for him to gain, firſt a thorough knowledge of his ſubject, and then arguments will naturally ſpring up in his mind proper to ſupport it: and if he be ſtill at a loſs, and find occaſion to have recourſe to theſe heads, he will readily perceive from whence to take thoſe which are beſt ſuited to his purpoſe.

19 II. *Of external topics.* When the orator reaſons from ſuch topics as do not ariſe from his ſubject, but from things of a different nature, theſe are called *external.* They are all taken from authorities, and are by one general name called *Teſtimonies.*

Now a teſtimony may be expreſſed by writing, ſpeech, or any other ſign proper to declare a perſon's mind. And all teſtimonies may be diſtinguiſhed into two ſorts, divine and human. A divine teſtimony, when certainly known to be ſuch, is inconteſtable, and admits of no debate, but ſhould be acquieſced in without heſitation. Indeed the ancient Greeks and Romans eſteemed the pretended oracles of their deities, the anſwers of their augurs, and the like fallacies, divine teſtimonies: but with us no one can be ignorant of their true notion, though they do not ſo directly come under our preſent conſideration. Human teſtimonies, conſidered as furniſhing the orator with arguments, may be reduced to three heads; *writings*, *witneſſes*, and *contracts*.

1. By *Writings*, here, are to be underſtood written laws, wills, or other legal inſtruments, expreſſed and conveyed in that manner. And it is not ſo much the force and validity of ſuch teſtimonies, conſidered in themſelves, that is here intended, as the occaſion of diſpute which may at any time ariſe concerning their true deſign and import, when produced in proof upon either ſide of a controverſy. And theſe are five; Ambiguity, Diſagreement between the words and intention, Contrariety, Reaſoning, and Interpretation.

A writing is then ſaid to be ambiguous, when it is capable of two or more ſenſes, which makes the writer's deſign uncertain. Now ambiguity may ariſe either from ſingle words, or the conſtruction of ſentences. From ſingle words; as when either the ſenſe of a word, or the application of it, is doubtful. As, ſhould it be queſtioned, whether ready money ought to be included under the appellation of chattels left by a will; or, if a teſtator bequeath a certain legacy to his nephew Thomas, and he has two nephews of that name. But ambiguity is alſo ſometimes occaſioned from the conſtruction of a ſentence; as when ſeveral things or perſons having been already mentioned, it is doubtful to which of them that which follows ought to be referred. For example, a perſon writes thus in his will: 'Let my heir give as a legacy to Titius, an horſe out of my ſtable, which he pleaſes.' Here it may be queſtioned, whether the word *he* refers to the heir or to Titius; and conſequently, whether the heir be allowed to give Titius which horſe he pleaſe, or Titius may chooſe which he likes beſt. Now as to controverſies of this kind, in the firſt caſe above-mentioned, the party who claims the chattels may plead, that all moveable goods come under that name, and therefore that he has a right to the money. This he will endeavour to prove from ſome inſtances where the word has been ſo uſed. The buſineſs of the oppoſite party is to refute this, by ſhewing that money is not there included. And if either ſide produce precedents in his favour, the other may endeavour to ſhew the caſes are not parallel. As to the ſecond caſe, ariſing from an ambiguity in the name, if any other words or expreſſions in the will ſeem to countenance either of the claimants, he will not fail to interpret them to his advantage. So likewiſe, if any thing ſaid by the teſtator, in his lifetime, or any regard ſhewn to either of theſe nephews more than the other, may help to determine which of them was intended, a proper uſe may be made of it. And the ſame may be ſaid with regard to the third caſe. In which the legatee may reaſon likewiſe from the common uſe of language, and ſhew, that in ſuch expreſſions, it is uſual to make the reference to the laſt or next antecedent; and from thence plead, that it was the deſign of the teſtator to give him the option. But in anſwer to this, it may be ſaid, that allowing it to be very often ſo, yet in this inſtance it ſeems more eaſy and natural to repeat the verb *give* after *pleaſes*, and ſo to ſupply the ſentence, *which he pleaſes to give him*, referring it to the heir, than to bring in the verb *chooſe*, which was not in the ſentence before; and ſo, by ſupplying the ſenſe, *which he pleaſes to chooſe*, to give the option to Titius. But where controverſies of this kind ariſe from a law, recourſe may be had to other laws where the ſame thing has been expreſſed with greater clearneſs; which may help to determine the ſenſe of the paſſage in diſpute.

A ſecond controverſy from writings is, when one party adheres to the words, and the other to what he aſſerts was the writer's intention. Now he who oppoſes the literal ſenſe, either contends, that what he himſelf offers is the ſimple and plain meaning of the writing, or that it muſt be ſo underſtood in the particular caſe in diſpute. An inſtance of the former is this, as we find it in Cicero. A perſon who died without children, but left a widow, had made this proviſion in his will: "If I have a ſon born to me, he ſhall be my heir." And a little after; "If my ſon die before he comes of age, let Curius be my heir." There is no ſon born: Curius therefore ſues for the eſtate, and pleads the intention of the teſtator, who deſigned him for his heir, if he ſhould have no ſon who arrived at age; and ſays, there can be no reaſon to ſuppoſe he did not intend the ſame perſon for his heir if he had no ſon, as if he ſhould have one who afterwards died in his minority. But the heir at law inſiſts upon the words of the will; which, as he ſays, require, that firſt a ſon ſhould be born, and afterwards die under age, before Curius can ſucceed to the inheritance; and there being no ſon, a ſubſtituted heir, as Curius was, can have no claim where the firſt heir does not exiſt, from whom he derives his pretenſion, and was to ſucceed by the appointment of the will. Of the latter caſe, rhetoricians give this example: "It was forbidden by a law to open the city-gates in the night. A certain perſon notwithſtanding, in time of war, did open them in the night, and let in ſome auxiliary troops, to prevent their being cut off by the enemy, who was poſted near the town." Afterwards, when the war was over, this perſon is arraigned, and tried for his life on account of this action. Now, in ſuch a caſe, the proſecutor founds his charge upon the expreſs words of the law; and pleads, that no ſufficient reaſon can be aſſigned for going contrary to the letter of it, which would be to make a new law, and not to execute one already made. The defendant, on the other hand, alleges, That the fact he is charged with cannot, however, come within the intention of the law; ſince he either could not, or ought not, to have complied with the letter of it in that particular caſe, which muſt therefore neceſſarily be ſuppoſed to have been excepted in the deſign of that law when it was made. But to this the proſecutor may reply, That all ſuch exceptions as are intended by any law, are uſually expreſſed in it: and inſtances may be brought of particular exceptions expreſſed in ſome laws; and if there be any ſuch exception in the law under debate, it ſhould eſpecially be mentioned. He may further add, That to admit of exceptions not expreſſed in the law itſelf, is to enervate the force of all laws, by explaining them away, and in effect to render them uſeleſs. And this he may further corroborate, by comparing the law under debate with others, and conſidering its nature and importance, and how far the public intereſt of the ſtate is concerned in the due and regular execution of it; from whence he may infer, that ſhould exceptions be admitted in other laws of leſs conſequence, yet, however, they ought not in this. Laſtly, he may conſider the reaſon alleged by the defendant, on which he founds his plea, and ſhew there was not that neceſſity of violating the law in the preſent caſe, as is pretended. And this is often the more requiſite, becauſe the party who diſputes againſt the words of the law, always endeavours to ſupport his allegations from the equity of the caſe. If, therefore, this plea can be enervated, the main ſupport of the defendant's cauſe is removed. For as the former arguments are deſigned to prevail with the judge, to determine the matter on this ſide the queſtion from the nature of the caſe; ſo the intention of this argument is to induce him to it, from the weakneſs of the defence made by the oppoſite party. But the defendant will, on the contrary, uſe ſuch arguments, as may beſt demonſtrate the equity of his cauſe, and endeavour to vindicate the fact from his good deſign and intention in doing it. He will ſay, That the laws have allotted puniſhments for the commiſſion of ſuch facts as are evil in themſelves, or prejudicial to others; neither of which can be charged upon the action for which he is accuſed: That no law can be rightly executed, if more regard be had to the words and ſyllables of the writing, than to the intention of the legiſlator. To which purpoſe, he may allege that direction of the law itſelf, which ſays, “The law ought not to be too rigoroſly interpreted, nor the words of it ſtrained; but the true intention and deſign of each part of it duly conſidered:” As alſo that ſaying of Cicero, “What law may not be weakened and deſtroyed, if we bend the ſenſe to the words, and do not regard the deſign and view of the legiſlator?” Hence he may take occaſion to complain of the hardſhip of ſuch a procedure, that no difference ſhould be made between an audacious and wilful crime, and an honeſt or neceſſary action, which might happen to diſagree with the letter of the law, though not with the intent of it. And as it was obſerved before to be of conſiderable ſervice to the accuſer, if he could remove the defendant's plea of equity; ſo it will be of equal advantage to the defendant, if he can fix upon any words in the law, which may in the leaſt ſeem to countenance his caſe, ſince this will take off the main force of the charge.

The third controverſy of this kind is, when two writings happen to claſh with each other, or at leaſt ſeem to do ſo. Of this Hermogenes gives the following inſtance. One law enjoins: “He who continues alone in a ſhip during a tempeſt, ſhall have the property of the ſhip.” Another law ſays, “A diſinherited ſon ſhall enjoy no part of his father's eſtate.” Now a ſon, who had been diſinherited by his father, happens to be in his father's ſhip in a tempeſt, and continues there alone, when every one elſe had deſerted it. He claims the ſhip by the former of theſe laws, and his brother tries his right with him by the latter. In ſuch caſes, therefore, it may firſt be conſidered, Whether the two laws can be reconciled. And if that cannot be done, then, Which of them appears more equitable. Alſo, Whether one be poſitive, and the other negative: becauſe prohibitions are a ſort of exceptions to poſitive injunctions. Or, If one be a general law, and the other more particular, and come nearer to the matter in queſtion. Likewiſe, Which was laſt made: ſince former laws are often abrogated, either wholly or in part, by ſubſequent laws; or at leaſt were deſigned to be ſo. Laſtly, it may be obſerved, Whether one of the laws be not plain and expreſs; and the other more dubious, or has any ambiguity in it. All, or any of which things, that party will not omit to improve for his advantage whoſe intereſt is concerned in it.

The fourth controverſy is *reaſoning*. As when ſomething, not expreſly provided for by a law, is inferred by a ſimilitude, or parity of reaſon, from what is contained in it. Quintilian mentions this inſtance of it. “There was a law made at Tarentum, to prohibit the exportation of wool, but a certain perſon exports ſheep.” In this caſe, the proſecutor may firſt compare the thing which occaſions the charge, with the words of the law, and ſhew their agreement, and how unneceſſary it was that particular thing ſhould have been expreſly mentioned in the law, ſince it is plainly contained in it, or at leaſt an evident conſequence from it. He may then plead, that many things of a like nature are omitted in other laws for the ſame reaſon. And, laſtly, he may urge the reaſonableneſs and equity of the procedure. The defendant, on the other hand, will endeavour to ſhew the deficiency of the reaſoning, and the difference between the two caſes. He will inſiſt upon the plain and expreſs words of the law, and ſet forth the ill tendency of ſuch inferences and concluſions drawn from ſimilitudes and compariſons, ſince there is ſcarce any thing but in ſome reſpect may bear a reſemblance to another.

The laſt controverſy under this head is *interpretation*, in which the diſpute turns upon the true meaning and explication of the law in reference to that particular caſe. We have the following inſtance of this in the Pandects: “A man who had two ſons, both under age, ſubſtitutes Titius as heir to him who ſhould die laſt, provided both of them died in their minority. They both periſh together at ſea before they came to age. Here ariſes a doubt, whether the ſubſtitution can take place, or the inheritance devolves to the heir at law.” The latter pleads, That as neither of them can be ſaid to have died laſt, the ſubſtitution cannot take place; which was ſuſpended, upon the condition that one died after the other. But to this it may be ſaid, It was the intention of the teſtator, that if both died in their nonage, Titius ſhould ſucceed to the inheritance; and therefore it makes no difference whether they died together, or one after the other: and ſo the law determines it.

2. The *ſecond* head of external arguments are *Witneſſes*. Theſe may either give their evidence, when abſent, in writing ſubſcribed with their name; or preſent, by word of mouth. And what both of them teſtify, may either be from hearſay; or what they ſaw themſelves, and were preſent at the time it was done. As the weight of the evidence may be thought greater or leſs on each of theſe accounts, either party will make ſuch uſe of it as he finds for his advantage. The characters of the witneſſes are alſo to be conſidered; and if any thing be found in their lives or behaviour that is juſtly exceptionable, to invalidate their evidence, it ought not to be omitted. And how they are affected to the contending parties, or either of them, may deſerve conſideration; for ſome allowances may be judged reaſonable in caſe of friendſhip, or enmity, where there is no room for any other exception. But regard ſhould chiefly be had to what they teſtify, and how far the cauſe is affected by it. Cicero is very large upon moſt of theſe heads in his defence of Marcus Fonteius, with a deſign to weaken the evidence of the Gauls againſt him. And where witneſſes are produced on one ſide only, as orators ſometimes attempt to leſſen the credit of this kind of proof, by pleading, that witneſſes are liable to be corrupted, or biaſſed by ſome prevailing intereſt or paſſion, to which arguments taken from the nature and circumſtances of things are not ſubject; it may be anſwered on the other hand, that ſophiſtical arguments and falſe colourings are not expoſed to infamy or puniſhment, whereas witneſſes are reſtrained by ſhame and penalties, nor would the law require them if they were not neceſſary.

3. The *third* and laſt head of external arguments are *Contracts*; which may be either public or private. By public are meant the tranſactions between different ſtates, as leagues, alliances, and the like; which depend on the laws of nations, and come more properly under deliberative diſcourſes, to which we ſhall refer them. Thoſe are called *private*, which relate to leſſer bodies or ſocieties of men, and ſingle perſons; and may be either written, or verbal. And it is not ſo much the true meaning and purport of them that is here conſidered, as their force and obligation. And, as the Roman law declares, ‘Nothing can be more agreeable to human faith, than that perſons ſhould ſtand to their agreements.’ Therefore, in controverſies of this kind, the party, whoſe intereſt it is that the contract ſhould be maintained, will plead, that ſuch covenants have the force of private laws, and ought religiouſly to be obſerved, ſince the common affairs of mankind are tranſacted in that manner; and therefore to violate them, is to deſtroy all commerce and ſociety among men. On the other ſide it may be ſaid, that juſtice and equity are chiefly to be regarded, which are immutable; and beſides, that the public laws are the common rule to determine ſuch differences, which are deſigned to redreſs thoſe who are aggrieved. And, indeed, where a compact has been obtained by force or fraud, it is in itſelf void, and has no effect either in law or reaſon. But on the other hand, the Roman lawyers ſeem to have very rightly determined, that all ſuch obligations as are founded in natural equity, though not binding by national laws, and are therefore called *nuda pacta*, ought, however, in honour and conſcience to be performed.

III. *Of the State of a Controverſy.* The ancients, obſerving that the principal queſtion or point of diſpute in all controverſies might be referred to ſome particular head, reduced thoſe heads to a certain number; that both the nature of the queſtion might by that means be better known, and the arguments ſuited to it be diſcovered with greater eaſe. And theſe heads they call *ſtates*. 20

By the ſtate of a controverſy, then, we are to underſtand the principal point in diſpute between contending parties, upon the proof of which the whole cauſe or controverſy depends. We find it expreſſed by ſeveral other names in ancient writers: as, the *conſtitution of the cauſe*, the *general head*, and the *chief queſtion*. And as this is the principal thing to be attended to in every ſuch diſcourſe; ſo it is what firſt requires the conſideration of the ſpeaker, and ſhould be well fixed and digeſted in his mind, before he proceeds to look for arguments proper to ſupport it. Thus Anthony, the Roman orator, ſpeaking of his own method in his pleading, ſays: “When I underſtand the nature of the cauſe, and begin to conſider it, the firſt thing I endeavour to do is, to ſettle with myſelf what that is to which all my diſcourſe relating to the matter in diſpute ought to be referred: then I diligently attend to theſe other two things, How to recommend myſelf, or thoſe for whom I plead, to the good eſteem of my hearers; and how to influence their minds, as may beſt ſuit my deſign.” This way of proceeding appears very agreeable to reaſon and prudence. For what can be more abſurd, than for a perſon to attempt the proof of any thing, before he has well ſettled in his own mind a clear and diſtinct notion, what the thing is which he would endeavour to prove? Quintilian deſcribes it to be, ‘That kind of queſtion which ariſes from the firſt conflict of cauſes.’ In judicial caſes, it immediately follows upon the charge of the plaintiff, and plea of the defendant. Our common law expreſſes it by one word, namely, the *iſſue*. Which interpreters explain, by deſcribing it to be, “That point of matter depending in ſuit, whereupon the parties join, and put their cauſe to the trial.” Examples will further help to illuſtrate this, and render it more evident. In the cauſe of Milo, the charge of the Clodian party is, *Milo killed Clodius*. Milo's plea or defence, *I killed him, but juſtly*. From hence ariſes this grand queſtion, or ſtate of the cauſe: *Whether it was lawful for Milo to kill Clodius?* And that Clodius was lawfully killed by Milo, is what Cicero in his defence of Milo principally endeavours to prove. This is the main ſubject of that fine and beautiful oration. The whole of his diſcourſe is to be conſidered as centering at laſt in this one point. Whatever different matters are occaſionally mentioned, will, if cloſely attended to, be found to have been introduced ſome way or other the better to ſupport and carry on this deſign: Now in ſuch caſes, where the fact is not denied, but ſomething is offered in its defence, the ſtate of the cauſe is taken from the defendant's plea, who is obliged to make it good: As in the inſtance here given, the chief point in diſpute was the lawfulneſs of Milo's action, which it was Cicero's buſineſs to demonſtrate. But when the defendant denies the fact, the ſtate of the cauſe ariſes from the accuſation; the proof of which then lies upon the plaintiff, and not, as in the former caſe, upon the defendant. So in the cauſe of Roſcius, the charge made againſt him is, *That he killed his father*. But he denies the fact. The grand queſtion therefore to be argued is: *Whether or not he killed his father?* The proof of this lay upon his accuſers. And Cicero's deſign in his defence of him is to ſhew, that they had not made good their charge. But it ſometimes happens, that the defendant neither abſolutely denies the fact, nor attempts to juſtify it; but only endeavours to qualify it, by denying that it is a crime of that nature, or deſerves that name, by which it is expreſſed in the charge. We have an example of this propoſed by Cicero: "A perſon is accuſed of ſacrilege, for taking a thing, that was ſacred, out of a private houſe. He owns the fact, but denies it to be ſacrilege; ſince it was committed in a private houſe, and not in a temple." Hence this queſtion ariſes: *Whether to take a ſacred thing out of a private houſe, is to be deemed ſacrilege, or only ſimple theft?* It lies upon the accuſer to prove what the other denies; and therefore the ſtate of the cauſe is here alſo, as well as in the preceding caſe, taken from the indictment.

But beſides the principal queſtion, there are other ſubordinate queſtions, which follow upon it in the courſe of a diſpute, and ſhould be carefully diſtinguiſhed from it. Particularly that which ariſes from the reaſon, or argument, which is brought in proof of the principal queſtion. For the principal queſtion itſelf proves nothing, but is the thing to be proved, and becomes at laſt the concluſion of the diſcourſe. Thus, in the cauſe of Milo, his argument is: *I killed Clodius juſtly, becauſe he aſſaſſinated me.* Unleſs the Clodian party be ſuppoſed to deny this, they give up their cauſe. From hence therefore this ſubordinate queſtion follows: *Whether Clodius aſſaſſinated Milo?* Now Cicero ſpends much time in the proof of this, as the hinge on which the firſt queſtion, and conſequently the whole cauſe, depended. For if this was once made to appear, the lawfulneſs of Milo's killing Clodius, which was the grand queſtion or thing to be proved, might be inferred as an allowed conſequence from it. This will be evident, by throwing Milo's argument, as uſed by Cicero, into the form of a ſyllogiſm.

An aſſaſſinator is lawfully killed:
Clodius was an aſſaſſinator:
Therefore he was lawfully killed by Milo, whom he aſſaſſinated.

If the minor propoſition of this ſyllogiſm was granted, no one would deny the concluſion: for the Roman law allowed of ſelf-defence. But as Cicero was very ſenſible this would not be admitted, ſo he takes much pains to bring the court into the belief of it. Now where the argument brought in defence of the ſecond queſtion is conteſted, or the orator ſuppoſes that it may be ſo, and therefore ſupports that with another argument, this occaſions a third queſtion conſequent upon the former; and in like manner he may proceed to a fourth. But be they more or fewer, they are to be conſidered but as one chain of ſubordinate queſtions dependent upon the firſt. And though each of them has its particular ſtate, yet none of theſe is what rhetoricians call *The ſtate of the Cauſe*, which is to be underſtood only of the principal queſtion. And if, as it frequently happens, the firſt or principal queſtion is itſelf directly proved from more than one argument; this makes no other difference, but that each of theſe arguments, ſo far as they are followed by others to ſupport them, become a diſtinct ſeries of ſubordinate queſtions, all dependent upon the firſt. As when Cicero endeavours to prove, that Roſcius did not kill his father, from two reaſons or arguments: *Becauſe he had neither any cauſe to move him to ſuch a barbarous action, nor any opportunity for it.*

Moreover, beſides theſe ſubordinate queſtions, there are alſo incidental ones often introduced, which have ſome reference to the principal queſtion, and contribute towards the proof it, though they are not neceſſarily connected with it, or dependent upon it. And each of theſe alſo has its ſtate, though different from that of the cauſe. For every queſtion, or point of controverſy, muſt be ſtated, before it can be made the ſubject of diſputation. And it is for this reaſon, that every new argument advanced by an orator is called a *queſtion;* becauſe it is conſidered as a freſh matter of controverſy. In Cicero's defence of Milo, we meet with ſeveral of this ſort of queſtions, occaſioned by ſome aſperſions which had been thrown out by the Clodian party to the prejudice of Milo. As, "That he was unworthy to ſee the light, who owned he had killed a man:" For Milo before his trial had openly confeſſed he killed Clodius. So likewiſe, "That the ſenate had declared the killing of Clodius was an illegal action." And further, "That Pompey, by making a new law to ſettle the manner of Milo's trial, had given his judgment againſt Milo." Now to each of theſe Cicero replies, before he proceeds to the principal queſtion. And therefore, though the queſtion, in which the ſtate of a controverſy conſiſts, is ſaid by Quintilian to ariſe from "the firſt conflict of cauſes," yet we find by this inſtance of Cicero, that it is not always the firſt queſtion in order, upon which the orator treats.

But it ſometimes happens, that the ſame cauſe or controverſy contains in it more than one ſtate. Thus in judicial cauſes, every diſtinct charge occaſions a new ſtate. All Cicero's orations againſt Verres relate to one cauſe, founded upon a law of the Romans againſt unjuſt exactions made by their governors of provinces upon the inhabitants; but as that proſecution is made up of as many charges as there are orations, every charge, or indictment, has its different ſtate. So likewiſe his oration in defence of Cœlius has two ſtates, in anſwer to a double charge made againſt him by his adverſaries: one, "for borrowing money of Clodia, in order to bribe certain ſlaves to kill a foreign ambaſſador;" and the other, "for an attempt afterward to poiſon Clodia herſelf." Beſides which, there were ſeveral other matters of a leſs heinous nature, which had been thrown upon him by his accuſers, with a deſign, very likely, to render the two principal charges more credible; to which Cicero firſt replies, in the ſame manner as in his defence of Milo.

Though all the examples we have hitherto brought to illuſtrate this ſubject, have been taken from judicial caſes; yet not only theſe, but very frequently diſcourſes of the deliberative kind, and ſometimes thoſe of the demonſtrative, are managed in a controverſial way. And all controverſies have their ſtate. And therefore Quintilian very juſtly obſerves, that "ſtates belong both to general and particular queſtions; and to all ſorts of cauſes, demonſtrative, deliberative, and judicial." In Cicero's oration for the Manilian law, this is the main point in diſpute between him, and thoſe who oppoſed that law: "Whether Pompey was the fitteſt perſon to be intruſted with the management of the war againſt Mithridates?" This is a ſubject of the deliberative kind. And of the ſame nature was that debate in the ſenate, concerning the demolition of Carthage. For the matter in diſpute between Cato, who argued for it, and thoſe who were of the contrary opinion, ſeems to have been this: "Whether it was for the intereſt of the Romans to demoliſh Carthage?" And ſo likewiſe in thoſe two fine orations of Cato and Cæſar, given us by Salluſt, relating to the conſpirators with Catiline, who were then in cuſtody, the controverſy turns upon this: "Whether thoſe priſoners ſhould be puniſhed with death, or perpetual impriſonment?" Examples of the demonſtrative kind are not ſo common; but Cicero's oration concerning the 'Anſwers of the ſoothſayers,' may afford us an inſtance of it. Several prodigies had lately happened at Rome, upon which the ſoothſayers being conſulted, aſſigned this as the reaſon of them, Becauſe ſome places conſecrated to the gods had been afterwards converted to civil uſes. Clodius charged this upon Cicero; whoſe houſe was rebuilt at the public expence, after it had been demoliſhed by Clodius, and the ground conſecrated to the goddeſs Liberty. Cicero in this oration retorts the charge; and ſhews, that the prodigies did not reſpect him, but Clodius. So that the queſtion in diſpute was: "To which of the two thoſe prodigies related?" This oration does not appear to have been ſpoken in a judicial way, and muſt therefore belong to the demonſtrative kind. His invective againſt Piſo is likewiſe much of the ſame nature, wherein he compares his own behaviour and conduct with that of Piſo.

As to the number of theſe ſtates, both Cicero and Quintilian reduce them to three. "We muſt (ſays Quintilian) agree with thoſe, whoſe authority Cicero follows, who tell us, that three things may be inquired into in all diſputes: Whether a thing is; what it is; and how it is. And this is the method which nature preſcribes. For in the firſt place, it is neceſſary the thing ſhould exiſt, about which the diſpute is: becauſe no judgment can be made either of its nature, or quality, till its exiſtence be manifeſt; which is therefore the firſt queſtion. But though it be manifeſt that a thing is, it does not preſently appear what it is; and when this is known, the quality yet remains: and after theſe three are ſettled, no further inquiry is neceſſary." Now the firſt of theſe three ſtates is called the *conjectural ſtate;* as if it be inquired, "Whether one perſon killed another?" This always follows upon the denial of a fact, by one of the parties; as was the caſe of Roſcius. And it receives its name from hence, that the judge is left, as it were, to conjecture, whether the fact was really committed or not, from the evidence produced on the other ſide. The ſecond is called the *definitive ſtate*, when the fact is not denied; but the diſpute turns upon the nature of it, and what name is proper to give it: as in that example of Cicero, "Whether to take a ſacred thing out of a private houſe be theft, or ſacrilege?" For in this caſe it is neceſſary to ſettle the diſtinct notion of thoſe two crimes, and ſhew their difference. The third is called the *ſtate of quality;* when the contending parties are agreed both as to the fact, and the nature of it; but the diſpute is, "Whether it be juſt or unjuſt, profitable or unprofitable, and the like;" as in the cauſe of Milo.

From what has been ſaid upon this ſubject, the uſe of it may in a good meaſure appear. For whoever engages in a controverſy, ought in the firſt place to conſider with himſelf the main queſtion in diſpute, to fix it well in his mind, and keep it conſtantly in his view; without which he will be very liable to ramble from the point, and bewilder both himſelf and his hearers. And it is no leſs the buſineſs of the hearers principally to attend to this; by which means they will be helped to diſtinguiſh and ſeparate from the principal queſtion what is only incidental, and to obſerve how far the principal queſtion is affected by it; to perceive what is offered in proof, and what is only brought in for illuſtration; not to be miſled by digreſſions, but to diſcern when the ſpeaker goes off from his ſubject, and when he returns to it again; and, in a word, to accompany him through the whole diſcourſe, and carry with them the principal chain of reaſoning upon which the cauſe depends, ſo as to judge upon the whole, whether he has made out his point, and the concluſion follows from the premiſes.

CHAP. II. *Of Arguments ſuited to Demonſtrative Diſcourſes.*

21 THESE conſiſt either in praiſe or diſpraiſe; and, agreeably to the nature of all contraries, one of them will ſerve to illuſtrate the other.

Now we either praiſe *perſons* or *things*.

I. In praiſing or diſpraiſing *perſons*, rhetoricians preſcribe two methods. One is, to follow the order in which every thing happened that is mentioned in the diſcourſe; the other is, to reduce what is ſaid under certain general heads, without a ſtrict regard to the order of time.

1. In purſuing the former method, the diſcourſe may be very conveniently divided into three periods. The firſt of which will contain what preceded the perſon's birth; the ſecond, the whole courſe of his life; and the third, what followed upon his death.

Under the firſt of theſe may be comprehended what is proper to be ſaid concerning his country or family. And therefore, if theſe were honourable, it may be ſaid to his advantage, that he noways diſgraced them, but acted ſuitably to ſuch a deſcent. But if they were not ſo, they may be either wholly omitted: or it may be ſaid, that, inſtead of deriving thence any advantage to his character, he has conferred a laſting honour upon them; and that it is not of ſo much moment where, or from whom, a perſon derives his birth, as how he lives.

In the ſecond period, which is that of his life, the qualities both of his mind and body, with his circumſtances in the world, may be ſeparately conſidered. Though, as Quintilian rightly obſerves: "All external advantages are not praiſes for themſelves, but according to the uſe that is made of them. For riches, and power, and intereſt, as they have great influence, and may be applied either to good or bad purpoſes, are a proof of the temper of our minds; and therefore we are either made better or worſe by them." But theſe things are a juſt ground for commendation, when they are the reward of virtue, or induſtry. Bodily endowments are health, ſtrength, beauty, activity, and the like; which are more or leſs commendable, according as they are employed. And where theſe, or any of them, are wanting, it may be ſhewn, that they are abundantly compenſated by the more valuable endowments of the mind. Nay, ſometimes a defect in theſe may give an advantageous turn to a perſon's character; for any virtue appears greater, in proportion to the diſadvantages the perſon laboured under in exerting it. But the chief topics of praiſe are taken from the virtues and qualifications of the mind. And here the orator may conſider the diſpoſition, education, learning, and ſeveral virtues, which ſhone through the whole courſe of the perſon's life. In doing which, the preference ſhould always be given to virtue above knowledge or any other accompliſhment. And in actions, thoſe are moſt conſiderable, and will be heard with greateſt approbation, which a perſon either did alone, or firſt, or wherein he had feweſt aſſociates; as likewiſe thoſe which exceeded expectation, or were done for the advantage of others rather than his own. And further, as the laſt ſcene of a man's life generally commands the greateſt regard, if any thing remarkable at that time was either ſaid or done, it ought particularly to be mentioned. Nor ſhould the manner of his death, or cauſe of it, if accompanied with any commendable circumſtances, be omitted; as if he died in the ſervice of his country, or in the purſuit of any other laudable deſign.

The third and laſt period relates to what followed after the death of the perſon. And here the public loſs, and public honours conferred upon the deceaſed, are proper to be mentioned. Sepulchres, ſtatutes, and other monuments to perpetuate the memory of the dead, at the expence of the public, were in common uſe both among the Greeks and Romans. But in the earlieſt times, as theſe honours were more rare, ſo they were leſs coſtly. For as in one age it was thought a ſufficient reward for him who died in the defence of his country, to have his name cut in a marble inſcription, with the cauſe of his death; ſo, in others, it was very common to ſee the ſtatues of gladiators, and perſons of the meaneſt rank, erected in public places. And therefore a judgment is to be formed of theſe things from the time, cuſtom, and circumſtances, of different nations; ſince the frequency of them renders them leſs honourable, and takes off from their evidence as the rewards of virtue. But, as Quintilian ſays, "Children are an honour to their parents, cities to their founders, laws to thoſe who compiled them, arts to their inventors, and uſeful cuſtoms to the authors of them."

And this may ſuffice for the method of praiſing perſons, when we propoſe to follow the order of time, as Iſocrates has done in his funeral oration upon Evagoras king of Salamis, and Pliny in his panegyric upon the emperor Trajan. But as this method is very plain and obvious, ſo it requires the more agreeable dreſs to render it delightful; leſt otherwiſe it ſeem rather like an hiſtory, than an oration: For which reaſon, we find, that epic poets, as Homer, Virgil, and others, begin with the middle of their ſtory, and afterwards take a proper occaſion to introduce what preceded, to diverſify the ſubject, and give the greater pleaſure and entertainment to their readers.

2. The other method above hinted was, to reduce the diſcourſe to certain general heads, without regarding the order of time. As if any one, in praiſing the elder Cato, ſhould propoſe to do it, by ſhewing, that he was a moſt prudent ſenator, an excellent orator, and moſt valiant general; all which commendations are given him by Pliny. In like manner, the character of a good general may be compriſed under four heads; ſkill in military affairs, courage, authority, and ſucceſs: from all which Cicero commends Pompey. And agreeably to this method Suetonius has written the lives of the firſt twelve Cæſars.

But in praiſing of perſons, care ſhould always be taken, to ſay nothing that may ſeem fictitious, or out of character, which may call the orator's judgment or integrity in queſtion. It was not without cauſe, therefore, that Lyſippus the ſtatuary, as Plutarch tells us, blamed Apelles for painting Alexander the Great with thunder in his hand; which could never ſuit his character as a man, however he might boaſt of his divine deſcent: for which reaſon Lyſippus himſelf made an image of him holding a ſpear, as the ſign of a warrior. Light and trivial things in commendations are likewiſe to be avoided, and nothing mentioned but what may carry in it the idea of ſomething truly valuable, and which the hearers may be ſuppoſed to wiſh for, and is proper to excite their emulation. Theſe are the principal heads of praiſe with relation to men. In diſpraiſe, the heads contrary to theſe are requiſite; which being ſufficiently clear from what has been ſaid, need not particularly be inſiſted on.

II. We proceed therefore to the other part of the diviſion, which reſpects *things*, as diſtinguiſhed from perſons. By which we are to underſtand all beings inferior to man, whether animate or inanimate; as likewiſe the habits and diſpoſitions of men, either good or bad, when conſidered ſeparately, and apart from their ſubjects, as arts and ſciences, virtues and vices, with whatever elſe may be a proper ſubject for praiſe or diſpraiſe. Some writers, indeed, have, for their own amuſement and the diverſion of others, diſplayed their eloquence in a jocoſe manner upon ſubjects of this kind. So Lucian has written in praiſe of a fly, and Syneſius an elegant encomium upon baldneſs. Others, on the contrary, have done the like in a ſatyrical way. Such is Seneca's apotheoſis or conſecration of the emperor Claudius; and the Myſopogon or beard-hater, written by Julian the emperor. Not to mention ſeveral modern authors, who have imitated them in ſuch ludicrous compoſitions. But as to theſe things, and all of the like nature, the obſervation of Antony in Cicero ſeems very juſt: "That it is not neceſſary to reduce every ſubject we diſcourſe upon to rules of art." For many are ſo trivial, as not to deſerve it; and others ſo plain and evident of themſelves, as not to require it. But ſince it frequently comes in the way both of orators and hiſtorians to deſcribe countries, cities, and facts, we ſhall briefly mention the principal heads of invention proper to illuſtrate each of theſe.

Countries, then, may be celebrated from the pleaſantneſs of their ſituation, the clemency and wholeſomeneſs of the air, and goodneſs of the ſoil; to which laſt may be referred the ſprings, rivers, woods, plains, mountains, and minerals. And to all theſe may be added their extent, cities, the number and antiquity of the inhabitants; their policy, laws, cuſtoms, wealth, character for cultivating the arts both of peace and war; their princes, and other eminent men they have produced. Thus Pacatus has given us a very elegant deſcription of Spain, in his panegyric upon the emperor Theodoſius, who was born there.

Cities are praiſed from much the ſame topics, as countries. And here, whatever contributes either to their defence, or ornament, ought particularly to be mentioned; as the ſtrength of the walls and fortifications, the beauty and ſplendor of the buildings, whether ſacred or civil, public or private. We have in Herodotus a very fine deſcription of Babylon, which was once the ſtrongeſt, largeſt, and moſt regular city in the world. And Cicero has accurately deſcribed the city of Syracuſe, in the iſland Sicily, in one of his orations againſt Verres.

But facts come much oftener under the cognizance of an orator. And theſe receive their commendation from their honour, juſtice, or advantage. But in deſcribing them, all the circumſtances ſhould be related in their proper order; and that in the moſt lively and affecting manner, ſuited to their different nature. Livy has repreſented the demolition of Alba by the Roman army, which was ſent thither to deſtroy it, through the whole courſe of that melancholy ſcene, in a ſtyle ſo moving and pathetic, that one can hardly forbear condoling with the inhabitants, upon reading his account.

But in diſcourſes of this kind, whether of praiſe or diſpraiſe, the orator ſhould (as he ought indeed upon all occaſions) well conſider where, and to whom, he ſpeaks. For the wiſe men often think very differently both of perſons and things from the common people. And we find that learned and judicious men are frequently divided in their ſentiments, from the ſeveral ways of thinking to which they have been accuſtomed. Beſides, different opinions prevail, and gain the aſcendant, at different times. While the Romans continued a free nation, love of their country, liberty, and public ſpirit, were principles in the higheſt eſteem among them. And therefore, when Cato killed himſelf, that he might not fall into the hands of Cæſar, and ſurvive the liberty of his country, it was thought an inſtance of the greateſt heroic virtue; but afterwards, when they had been accuſtomed to an arbitrary government, and the ſpirit of liberty was now loſt, the poet Martial could venture to ſay,

> Death to avoid 'tis madneſs ſure to die.

A prudent orator therefore will be cautious of oppoſing any ſettled and prevailing notions of thoſe to whom he addreſſes; unleſs it be neceſſary, and then he will do it in the ſofteſt and moſt gentle manner.

Chap. III. *Of Arguments ſuited to Deliberative Diſcourſes.*

22 This kind of diſcourſes muſt certainly have been very ancient; ſince, doubtleſs, from the firſt beginning of mens converſing together, they deliberated upon their common intereſt, and offered their advice to each other. But neither thoſe of the laudatory nor judicial kind could have been introduced, till mankind were ſettled in communities, and found it neceſſary to encourage virtue by public rewards, and bring vice under the reſtraint of laws. The early practice of ſuaſory diſcourſes appears from ſacred writ, where we find, that when Moſes was ordered upon an embaſſy into Egypt, he would have excuſed himſelf for want of eloquence. And Homer repreſents the Greeks at the ſiege of Troy, as flocking like a ſwarm of bees to hear their generals harangue them. Nor is this part of oratory leſs conſpicuous for its uſefulneſs to mankind, than its antiquity; being highly beneficial either in councils, camps, or any ſocieties of men. How many inſtances have we upon record, where the fury of an enraged multitude has been checked and appeaſed by the prudent and artful perſuaſion of ſome particular perſon? The ſtory of Agrippa Menenius, when the commons of Rome withdrew from the ſenators, and retired out of the city, is too well known, to need reciting. And how often have armies been animated and fired to the moſt dangerous exploits, or recalled to their duty, when ready to mutiny, by a moving ſpeech of their general? many inſtances of which we find in hiſtory.

All deliberation reſpects ſomething future, for it is in vain to conſult about what is already paſt. The ſubject-matter of it is, either things public or private, ſacred or civil; indeed all the valuable concerns of mankind, both preſent and future, come under its regard. And the end propoſed by this kind of diſcourſes is chiefly profit or intereſt. But ſince nothing is truly profitable, but what is in ſome reſpect good; and every thing, which is good in itſelf, may not in all circumſtances be for our advantage; properly ſpeaking, what is both good and profitable, or beneficial good, is the end here deſigned. And therefore, as it ſometimes happens, that what appears profitable, may ſeem to interfere with that which is ſtrictly juſt and honourable; in ſuch caſes it is certainly moſt adviſeable to determine on the ſafer ſide of honour and juſtice, notwithſtanding ſome plauſible things may be offered to the contrary. But where the diſpute lies apparently between what is truly honeſt, and ſome external advantage propoſed in oppoſition to it, all good men cannot but agree in favour of honeſty. Such was the caſe of Regulus, who, being taken priſoner by the Carthaginians, was permitted to go to Rome upon giving his oath, that unleſs he could perſuade the ſenate to ſet at liberty ſome young Carthaginian noblemen, then priſoners at Rome, in exchange for him, he ſhould return again to Carthage. But Regulus, when he came to Rome, was ſo far from endeavouring to prevail with the ſenate to comply with the deſire of the Carthaginians, that he uſed all his intereſt to diſſuade them from hearkening to the propoſal. Nor could the moſt earneſt intreaties of his neareſt relations and friends, nor any arguments they were able to offer, engage him to continue at Rome, and not return again to Carthage. He had then plainly in his view, on the one ſide, eaſe, ſecurity, affluence, honours, and the enjoyment of his friends; and on the other, certain death, attended with cruel torments. However, thinking the former not conſiſtent with truth and juſtice, he choſe the latter. And he certainly acted as become an honeſt and brave man, in chooſing death, rather than to violate his oath. Though whether he did prudently in perſuading the ſenate not to make the exchange, or they in complying with him, we ſhall leave others to determine. Now, when it proves to be a matter of debate, whether a thing upon the whole be really beneficial or not; as here ariſe two parts, advice and diſſuaſion, they will each require proper heads of argument. But as they are contrary to each other, he who is acquainted with one, cannot well be ignorant of the other. We ſhall therefore chiefly mention thoſe proper for advice, from whence ſuch as are ſuited to diſſuade will eaſily be perceived. Now the principal heads of this kind are theſe following, which are taken from the nature and properties of the thing itſelf under conſideration.

1. *Pleaſure* often affords a very cogent argument in diſcourſes of this nature. Every one knows what an influence this has upon the generality of mankind. Though, as Quintilian remarks, pleaſure ought not of itſelf to be propoſed as a fit motive for action in ſerious diſcourſes, but when it is deſigned to recommend ſomething uſeful, which is the caſe here. So, would any one adviſe another to the purſuit of polite literature, Cicero has furniſhed him with a very ſtrong inducement to it from the pleaſure which attends that ſtudy, when he ſays: "If pleaſure only was propoſed by theſe ſtudies, you would think them an entertainment becoming a man of ſenſe and a gentleman. For other purſuits neither agree with all times, all ages, nor all places; but theſe ſtudies improve youth, delight old age, adorn proſperity, afford a refuge and comfort in adverſity, divert us at home, are no hindrance abroad, ſleep, travel, and retire with us into the country."

2. *Profit*, or advantage. This has no leſs influence upon many perſons than the former; and when it reſpects things truly valuable, it is a very juſt and laudable motive. Thus Cicero, when he ſends his *Books of offices* to his ſon, which he wrote in Latin for his uſe, adviſes him to make the beſt advantage both of his tutor's inſtructions, and the converſation at Athens, where he then was; but withal to peruſe his philoſophical treatiſes, which would be doubly uſeful to him, not only upon account of the ſubjects, but likewiſe of the language, as they would enable him to expreſs himſelf upon thoſe arguments in Latin, which before had only been treated of in Greek.

3. *Honour;* than which no argument will ſooner prevail with generous minds, or inſpire them with greater ardour. Virgil has very beautifully deſcribed Hector's ghoſt appearing to Æneas the night Troy was taken, and adviſing him to depart from this motive of honour:

> O goddeſs born, eſcape by timely flight
> The flames, and horrors of this fatal night.
> The foes already have poſſeſs'd the wall,
> Troy nods from high, and totters to her fall.
> Enough is paid to Priam's royal name;
> More than enough to duty, and to fame.
> If by a mortal hand my father's throne
> Cou'd be defended, 'twas by mine alone.

The argument here made uſe of to perſuade Æneas to leave Troy immediately, is, that he had done all that could be expected from him, either as a good ſubject or brave ſoldier, both for his king and country; which were ſufficient to ſecure his honour: and now there was nothing more to be expected from him, when the city was falling, and impoſſible to be ſaved; which could it have been preſerved by human power, he himſelf had done it.

But although a thing conſidered in itſelf appear beneficial if it could be attained, yet the expediency of undertaking it may ſtill be queſtionable; in which caſe the following heads taken from the circumſtances which attend it, will afford proper arguments to engage in it.

(1.) The *poſſibility* of ſucceeding may ſometimes be argued, as one motive to this end. So Hannibal endeavoured to convince king Antiochus, that it was poſſible for him to conquer the Romans, if he made Italy the ſeat of the war; by obſerving to him, not only that the Gauls had formerly deſtroyed their city; but that he had himſelf defeated them, in every battle he fought with them in that country.

(2.) But an argument founded upon *probability* will be much more likely to prevail. For in many affairs of human life, men are determined either to proſecute them or not, as the proſpect of ſucceſs appears more or leſs probable. Hence Cicero, after the fatal battle at Pharſalia, diſſuades thoſe of Pompey's party, with whom he was engaged, from continuing the war any longer againſt Cæſar; becauſe it was highly improbable, after ſuch a defeat, by which their main ſtrength was broken, that they ſhould be able to ſtand their ground, or meet with better ſucceſs than they had before.

(3.) But further, ſince probability is not a motive ſtrong enough with many perſons to engage in the proſecution of a thing which is attended with conſiderable difficulties, it is often neceſſary to repreſent the facility of doing it, as a further reaſon to induce them to it. And therefore Cicero makes uſe of this argument to encourage the Roman citizens in oppoſing Mark Anthony (who upon the death of Cæſar had aſſumed an arbitrary power), by repreſenting to them, that his circumſtances were then deſperate, and that he might eaſily be vanquiſhed.

(4.) Again, if the thing adviſed can be ſhewn to be in any reſpect neceſſary, this will render the motive ſtill much ſtronger for undertaking it. And therefore Cicero joins this argument with the former, to prevail with the Roman citizens to oppoſe Anthony, by telling them, that "The conſideration before them was, not in what circumſtances they ſhould live; but whether they ſhould live at all, or die with ignominy and diſgrace." This way of reaſoning will ſometimes prevail when all others prove ineffectual. For ſome perſons are not to be moved, till things are brought to an extremity, and they find themſelves reduced to the utmoſt danger.

(5.) To theſe heads may be added the conſideration

tion of the *event*, which in ſome caſes carries great weight with it. As when we adviſe to the doing of a thing from this motive, That whether it ſucceed or not, it will yet be of ſervice to undertake it. So after the great victory gained by Themiſtocles over the Perſian fleet at the ſtraits of Salamis, Mardonius adviſed Xerxes to return into Aſia himſelf, leſt the report of his defeat ſhould occaſion an inſurrection in his abſence: but to leave behind him an army of 300,000 men under his command; with which, if he ſhould conquer Greece, the chief glory of the conqueſt would redound to Xerxes; but if the deſign miſcarried, the diſgrace would fall upon his generals.

Theſe are the principal heads which furniſh the orator with proper arguments in giving advice. Cicero, in his oration for the Manilian law, where he endeavours to perſuade the Roman people to chooſe Pompey for their general in the Mithridatic war, reaſons from three of theſe topics, into which he divides his whole diſcourſe; namely, the neceſſity of the war, the greatneſs of it, and the choice of a proper general. Under the firſt of theſe he ſhews, that the war was neceſſary from four conſiderations; the honour of the Roman ſtate, the ſafety of their allies, their own revenues, and the fortunes of many of their fellow citizens, which were all highly concerned in it, and called upon them to put a ſtop to the growing power of king Mithridates, by which they were all greatly endangered. So that this argument is taken from the head of *neceſſity*. The ſecond, in which he treats of the greatneſs of the war, is founded upon the topic of *poſſibility*. For though he ſhews the power of Mithridates to be very great, yet not ſo formidable, but that he might be ſubdued; as was evident from the many advantages Lucullus had gained over him and his aſſociates. In the third head, he endeavours to prevail with them to intruſt the managment of the war in the hands of Pompey, whom he deſcribes as a conſummate general, for his ſkill in military affairs, courage, authority, and ſucceſs; in all which qualities he repreſents him as ſuperior to any other of their generals whom they could at that time make choice of. The deſign of all which was, to perſuade them, that they had very good reaſon to hope for ſucceſs, and a happy event of the war, under his conduct. So that that the whole force of his reaſoning under this head is drawn from *probability*. Theſe are the three general topics which make up that fine diſcourſe. Each of which is indeed ſupported by divers other arguments and conſiderations, which will be obvious in peruſing the oration itſelf, and therefore need not be here enumerated. On the contrary, in another oration he endeavours to diſſuade the ſenate from conſenting to a peace with Mark Anthony, becauſe it was baſe, dangerous, and impracticable.

But no ſmall ſkill and addreſs are required in giving advice. For ſince the tempers and ſentiments of mankind, as well as their circumſtances, are very different and various; it is often neceſſary to accommodate the diſcourſe to their inclinations and opinions of things. And therefore the weightieſt arguments are not always the moſt proper, and fitteſt to be uſed on all occaſions. Cicero, who was an admirable maſter of this art, and knew perfectly well how to ſuit what he ſaid to the taſte and reliſh of his hearers, in treating upon this ſubject, diſtinguiſhes mankind into two ſorts; the ignorant and unpoliſhed, who always prefer profit to honour; and ſuch as are more civilized and polite, who prefer honour and reputation to all other things. Wherefore they are to be moved by theſe different views: Praiſe, glory, and virtue, influence the one; while the other is only to be engaged by a proſpect of gain and pleaſure. Beſides, it is plain, that the generality are much more inclined to avoid evils than to purſue what is good; and to keep clear of ſcandal and diſgrace, than to practiſe what is truly generous and noble. Perſons likewiſe of a different age act from different principles; young men for the moſt part view things in another light, from thoſe who are older, and have had more experience, and conſequently are not to be influenced by the ſame motives.

CHAP. IV. *Of Arguments ſuited to Judicial Diſcourſes.*

23 In *judicial* controverſies there are two parties; the plaintiff or proſecutor, and the defendant or perſon charged. The ſubject of them is always ſomething paſt. And the end propoſed by them Cicero calls *equity*, or *right and equity*; the former of which ariſes from the laws of the country, and the latter from reaſon and the nature of things. For at Rome the prætors had a court of equity, and were empowered, in many caſes relating to property, to relax the rigour of the written laws. But as this ſubject is very copious, and cauſes may ariſe from a great variety of things, writers have reduced them to three heads, which they call *ſtates*, to ſome one of which all judicial proceedings may be referred; namely, *whether a thing is*, *what it is*, or *how it is*. By the *ſtate* of a cauſe therefore is meant the principal queſtion in diſpute, upon which the whole affair depends. Which, if it ſtops in the firſt inquiry, and the defendant denies the fact, the ſtate is called *conjectural*; but if the fact be acknowledged, and yet denied to be what the adverſary calls it, it is termed *definitive*; but if there is no diſpute either about the fact or its name, but only the juſtice of it, it is called the *ſtate of quality*: as was ſhewn more largely before under nº 20. But we there conſidered theſe ſtates only in a general view, and deferred the particular heads of argument proper for each of them, to this *judicial* kind of diſcourſes; where they moſt frequently occur, and from which examples may eaſily be accommodated to other ſubjects.

All judicial cauſes are either *private* or *public*. Thoſe are called *private*, which relate to the right of particular perſons; and they are likewiſe called *civil* cauſes, as they are converſant about matters of property. *Public* cauſes are thoſe which relate to public juſtice and the government of the ſtate; which are alſo called *criminal*, becauſe by them crimes are proſecuted, whether capital, or thoſe of a leſs heinous nature. We ſhall take the heads of the arguments only from this latter kind, becauſe they are more copious, and eaſy to be illuſtrated by examples; from which ſuch as agree to the former, namely *civil* cauſes, will ſufficiently appear.

1. The *conjectural* ſtate. When the accuſed perſon denies the fact, there are three things which the proſecutor has to conſider; whether he *would* have done it, whether he *could*, and whether he *did* it. And

hence ariſe three topics; from the *will*, the *power*, and the *ſigns* or circumſtances which attended the action. The affections of the mind diſcover the will; as, paſſion, an old grudge, a deſire of revenge, a reſentment of an injury, and the like. Therefore Cicero argues from Clodius's hatred of Milo, that he deſigned his death; and from thence infers, that he was the agreſſor in the combat between them, wherein Clodius was killed. This is what he principally endeavours to prove, and comes properly under this ſtate: for Milo owned that he killed him, but alleged that he did it in his own defence. So that in regard to this point, Which of them aſſaulted the other, the charge was mutual. The proſpect of advantage may alſo be alleged to the ſame purpoſe. Hence it is ſaid of L. Caſſius, that whenever he ſat as judge in a caſe of murder, he uſed to adviſe and move the court, to examine, to whom the advantage aroſe from the death of the deceaſed. And Cicero puts this to Anthony concerning the death of Cæſar. "If any one (ſays he) ſhould bring you upon trial, and uſe that ſaying of Caſſius, *Cui bono?* "Who got by it?" look to it, I beſeech you, that you are not confounded." To theſe arguments may be added, hope of impunity, taken either from the circumſtances of the accuſed perſon, or of him who ſuffered the injury. For perſons, who have the advantage of intereſt, friends, power, or money, are apt to think they may eaſily eſcape; as likewiſe ſuch, who have formerly committed other crimes with impunity. Thus Cicero repreſents Clodius as hardened in vice, and above all the reſtraint of laws, from having ſo often eſcaped puniſhment upon committing the higheſt crimes. On the contrary, ſuch a confidence is ſometimes raiſed from the condition of the injured party, if he is indigent, obſcure, timorous, or deſtitute of friends; much more if he has an ill reputation, or is loaded with popular hatred and reſentment. It was this preſumption of the obſcurity of Roſcius, who lived in the country, and his want of intereſt at Rome, which encouraged his accuſers to charge him with killing his father, as Cicero ſhews in his defence of him. Laſtly, the temper of a perſon, his views, and manner of life, are conſiderations of great moment in this matter. For perſons of bad morals, and ſuch as are addicted to vice, are eaſily thought capable of committing any wickedneſs. Hence Salluſt argues from the evil diſpoſition and vitious life of Catiline, that he affected to raiſe himſelf upon the ruins of his country. The ſecond head is the *power* of doing a thing: and there are three things which relate to this, the *place*, the *time*, and *opportunity*. As if a crime is ſaid to have been committed in a private place, where no other perſon was preſent; or in the night; or when the injured perſon was unable to provide for his defence. Under this head, may likewiſe be brought in the circumſtances of the perſons; as if the accuſed perſon was ſtronger, and ſo able to overpower the other; or more active, and ſo could eaſily make his eſcape. Cicero makes great uſe of this topic in the caſe of Milo, and ſhews, that Clodius had all the advantages of *place*, *time*, and *opportunity*, to execute his deſign of killing him. The third head comprehends the *ſigns* and circumſtances, which either preceded, accompanied, or followed, the commiſſion of the fact. So threats, or the accuſed perſon being ſeen at or near the place before the fact was committed, are circumſtances that may probably precede murder; fighting, crying out, bloodſhed, are ſuch as accompany it; paleneſs, trembling, inconſiſtent anſwers, heſitation, or faltering of the ſpeech, ſomething found upon the perſon accuſed which belonged to the deceaſed, are ſuch as follow it. Thus Cicero proves, that Clodius had threatened the death of Milo, and given out that he ſhould not live above three days at the fartheſt. Theſe arguments, taken from conjectures, are called *preſumptions*, which, though they do not directly prove that the accuſed perſon committed the fact with which he is charged; yet when, laid together, they appeared very ſtrong, ſentence by the Roman law might ſometimes be given upon them, to convict him.

Theſe are the topics from which the proſecutor takes his arguments. Now the buſineſs of the defendant is to invalidate theſe. Therefore ſuch as are brought from the *will*, he either endeavours to ſhew are not true, or ſo weak as to merit very little regard. And he refutes thoſe taken from the *power*, by proving that he wanted either opportunity or ability: as, if he can ſhew, that neither the place nor time inſiſted on was at all proper; or that he was then in another place. In like manner he will endeavour to confute the *circumſtances*, if they cannot be directly denied, by ſhewing that they are not ſuch as do neceſſarily accompany the fact, but might have proceeded from other cauſes, though nothing of what is alleged had been committed; and it will be of great ſervice to aſſign ſome other probable cauſe. But ſometimes the defendant does not only deny that he did the fact, but charges it upon another. Thus Cicero, in his oration for Roſcius, not only defends him from each of theſe three heads, but likewiſe charges the fact upon his accuſers.

2. The *definitive* ſtate, which is principally concerned in defining and fixing the name proper to the fact: though orators ſeldom make uſe of exact definitions, but commonly chooſe larger deſcriptions, taken from various properties of the ſubject or thing deſcribed.

The heads of argument in this ſtate are much the ſame to both parties. For each of them defines the fact his own way, and endeavours to refute the other's definition. We may illuſtrate this by an example from Quintilian: "A perſon is accuſed of ſacrilege, for ſtealing money out of a temple, which belonged to a private perſon." The fact is owned; but the queſtion is, *Whether it be properly ſacrilege?* The proſecutor calls it ſo, becauſe it was taken out of a temple. But ſince the money belonged to a private perſon, the defendant denies it to be ſacrilege, and ſays it is only ſimple theft. Now the reaſon why the defendant uſes this plea, and inſiſts upon the diſtinction, is, becauſe by the Roman law the penalty of theft was only four times the value of what was ſtolen; whereas ſacrilege was puniſhed with death. The proſecutor then forms his definition agreeable to his charge, and ſays, "To ſteal any thing out of a ſacred place is ſacrilege." But the defendant excepts againſt this definition, as defective; and urges, that it does not amount to ſacrilege, unleſs the thing ſtolen was likewiſe ſacred. And this caſe might once, perhaps, have been a matter of controverſy, ſince we find it expreſsly determined in the Pandects, that "An action of ſacrilege ſhould not lie, but only of theft, againſt any one who ſhould ſteal the goods of private perſons depoſited in a temple."

The ſecond thing is the proof brought by each party each party to ſupport his definition; as in the example given us by Cicero, of one "who carried his cauſe by bribery, and was afterwards proſecuted again upon an action of prevarication." Now, if the defendant was caſt upon this action, he was, by the Roman law, ſubjected to the penalty of the former proſecution. Here the proſecutor defines prevarication to be, *Any bribery or corruption in the defendant, with a deſign to pervert juſtice.* The defendant therefore, on the other hand, reſtrains it to *bribing only the proſecutor.*

And if this latter ſenſe agrees better with the common acceptation of the word, the proſecutor in the third place pleads the intention of the law, which was to comprehend all bribery in judicial matters under the term of *prevarication.* In anſwer to which the defendant endeavours to ſhew, either from the head of contraries, that a real proſecutor and a prevaricator are uſed as oppoſite terms in the law; or from the etymology of the word, that a prevaricator denotes one who pretends to appear in the proſecution of a cauſe, while in reality he favours the contrary ſide; and conſequently, that money given for this end, only can, in the ſenſe of the law, be called *prevarication.*

Laſtly, the proſecutor pleads, that it is unreaſonable, that he who does not deny the fact, ſhould eſcape by a cavil about a word. But the defendant inſiſts upon his explication as agreeable to the law; and ſays, the fact is miſrepreſented and blackened, by affixing to it a wrong name.

3. The third ſtate is that of *quality,* in which the diſpute turns upon the juſtice of an action. And here the defendant does not deny he did the thing he is charged with; but aſſerts it to be right and equitable, from the circumſtances of the caſe, and the motives which induced him to it.

And, firſt, he ſometimes alleges, the reaſon of doing it was in order to prevent ſome other thing of worſe conſequence, which would otherwiſe have happened. We have an inſtance of this in the life of Epaminondas, who, with two other generals joined in the command with him, marched the Theban army into Peloponneſus againſt the Lacedemonians; but by the influence of a contrary faction at home, their commiſſions were ſuperſeded, and other generals ſent to command the army. But Epaminondas, being ſenſible that, if he obeyed this order at that time, it would be attended with the loſs of the whole army, and conſequently the ruin of the ſtate, refuſed to do it; and having perſuaded the other generals to do the like, they happily finiſhed the war in which they were engaged; and upon their return home, Epaminondas taking the whole matter upon himſelf, on his trial was acquitted. The arguments proper in this caſe are taken from the juſtice, uſefulneſs, or neceſſity, of the action. The accuſer therefore will plead, that the fact was not juſt, profitable, nor neceſſary, conſidered either in itſelf, or comparatively with that for the ſake of which it is ſaid to have been done: and he will endeavour to ſhew, that what the defendant aſſigns for the reaſon of what he did, might not have happened as he pretends. Beſides, he will repreſent of what ill conſequence it muſt be, if ſuch crimes go unpuniſhed. The defendant, on the other hand, will argue from the ſame heads, and endeavour to prove the fact was juſt, uſeful, or neceſſary. And he will further urge, that no juſt eſtimate can be made of any action, but from the circumſtances which attend it; as the deſign, occaſion, and motives for doing it: which he will repreſent in the moſt favourable light to his own cauſe, and endeavour to ſet them in ſuch a view, as to induce others to think they could not but have done the ſame in the like circumſtances.

Again, the cauſe of an action is ſometimes charged by the defendant upon the party who received the damage, or ſome other perſon, who either made it neceſſary, or injoined him to do it. The firſt of theſe was Milo's plea for killing Clodius, becauſe he aſſaulted him with a deſign to take away his life. Here the fact is not denied, as in the caſe of Roſcius abovementioned, under the *conjectural* ſtate; but juſtified from the reaſon of doing it. For that an aſſaſſinator might be juſtly killed, Cicero ſhews both from law and reaſon. The accuſer, therefore, in ſuch a caſe, will, if there be room for it, deny the truth of this allegation. So the friends of Clodius affirmed that Milo was the aggreſſor, and not Clodius; which Cicero, in his defence of Milo, principally labours to refute. In the ſecond caſe, the proſecutor will ſay, No one ought to offend becauſe another has offended firſt; which defeats the courſe of public juſtice, renders the laws uſeleſs, and deſtroys the authority of the magiſtrate. The defendant, on the other hand, will endeavour to repreſent the danger and neceſſity of the caſe, which required an immediate remedy, and in that manner; and urges, that it was vain and impracticable to wait for redreſs in the ordinary way, and therefore no ill conſequence can ariſe to the public. Thus Cicero, in defending Sextius, who was proſecuted for a riot in bringing armed men into the forum, ſhews that his deſign was only to repel force with force; which was then neceſſary, there being no other means left for the people to aſſemble, who were excluded by a mob of the contrary party. Of the third caſe we have alſo an example in Cicero, who tells us, that, "in making a league between the Romans and Samnites, a certain young nobleman was ordered by the Roman general to hold the ſwine (deſigned for a ſacrifice); but the ſenate afterwards diſapproving the terms, and delivering up their general to the Samnites, it was moved, Whether this young man ought not likewiſe to be given up." Thoſe who were for it might ſay, that, to allege the command of another, is not a ſufficient plea for doing an ill action; and this is what the Roman law now expreſsly declares. But in anſwer to that, it might be replied, that it was his duty to obey the command of his general, who was anſwerable for his own orders, and not thoſe who were obliged to execute them; and therefore, to give up this young nobleman would be to puniſh one perſon for the fault of another.

Laſtly, a fact is ſometimes rather excuſed than defended, by pleading that it was not done deſignedly, or with any ill intent. This is called *conceſſion;* and conſiſts of two parts, *apology* and *intreaty*. The former repreſents the matter as the effect of inadvertency, chance, or neceſſity. Ariſtotle gives us an example of inadvertency or imprudence in a woman at Athens, who gave a young man a love-potion, which killed him; for which ſhe was tried, but acquitted: though afterwards this was made criminal by the Roman law. The caſe of Adraſtus, as related by Herodotus, is an inſtance of chance; who being intruſted by Crœſus with the care of his ſon, as they were hunting, killed him accidentally with a javelin which he threw at a boar. It is neceſſity, when a perſon excuſes his making a default, from ſtreſs of weather, ſickneſs, or the like. Thus Cicero pleaded his illneſs, contracted by the fatigue of a long journey, as an excuſe for not appearing in the ſenate upon the ſummons of Mark Antony, who threatened to oblige him to it by pulling his houſe down. But what the defendant here attributes to inadvertency, chance, or neceſſity, the oppoſite party will attribute to deſign, negligence, or ſome other culpable reaſon; and repreſent it as a matter injurious to the public to introduce ſuch precedents; and alſo produce inſtances, if that can be done, where the like excuſes have not been admitted. On the other hand, the defendant will inſiſt on his innocence, and ſhew the hardſhip and ſeverity of judging mens actions rather by the event, than from the intention: that ſuch a procedure makes no difference between the innocent and the guilty; but muſt neceſſarily involve many honeſt men in ruin and deſtruction, diſcourage all virtuous and generous deſigns, and turn greatly to the prejudice of human ſociety. He will alſo conſider the inſtances alleged by the accuſer, and ſhew the difference between them and his own caſe. And, laſtly, he will have recourſe to intreaty, or a ſubmiſſive addreſs to the equity and clemency of the court, or party offended, for pardon; as Cicero has done in his oration to Cæſar, in favour of Ligarius.

CHAP. V. *Of the Character and Addreſs of an Orator.*

24 HAVING conſidered and explained the firſt part of invention, which furniſhes the orator with ſuch arguments as are neceſſary for the proof of his ſubject, we are next to ſhew what are the proper means to conciliate the minds of his hearers; to gain their affection; and to recommend both himſelf, and what he ſays, to their good opinion and eſteem. For the parts of invention are commonly thus diſtinguiſhed; that the firſt reſpects the *ſubject* of the diſcourſe, the ſecond the *ſpeaker*, and the third the *hearers*. Now the ſecond of theſe, what we have at preſent to explain, is by Quintilian called a *propriety of manners*. And in order to expreſs this, it is neceſſary, as he tells us, "that every thing appear eaſy and natural, and the diſpoſition of the ſpeaker be diſcovered by his words." We may form an eaſy conception of this from the conduct of ſuch perſons who are moſt nearly concerned in each others welfare. As when relations or friends converſe together upon any affairs of importance, the temper and diſpoſition of the ſpeaker plainly ſhews itſelf by his words and manner of addreſs. And what nature here directs to without colouring or diſguiſe, the orator is to endeavour to perform by his art. Though indeed, if what a perſon ſays, be inconſiſtent with his uſual conduct and behaviour at other times; he cannot expect it ſhould gain much credit, or make any deep impreſſion upon his hearers: which may be one reaſon, why the ancient rhetoricians make it ſo neceſſary a qualification in an orator, that he be a good man; ſince he ſhould always be conſiſtent with himſelf, and, as we ſay, talk in character. And therefore it is highly requiſite, that he ſhould not only gain the ſkill of aſſuming thoſe qualities which the nature and circumſtances of his diſcourſe require him to expreſs; but likewiſe, that he ſhould uſe his utmoſt endeavours to get the real habits implanted in his mind. For as by this means they will be always expreſſed with greater eaſe and facility; ſo, by appearing conſtantly in the courſe of his life, they will have more weight and influence upon particular occaſions.

Now there are four qualities, more eſpecially ſuited to the character of an orator, which ſhould always appear in his diſcourſes, in order to render what he ſays acceptable to his hearers; and theſe are, *wiſdom*, *integrity*, *benevolence*, and *modeſty*.

1. *Wiſdom* is neceſſary; becauſe we eaſily give into thoſe whom we eſteem wiſer and more knowing than ourſelves. Knowledge is very agreeable and pleaſant to all, but few make very great improvements in it; either by reaſon they are employed in other neceſſary affairs, and the mind of man cannot attend to many things at once; or becauſe the way to knowledge at firſt is hard and difficult, ſo that perſons either do not care to enter upon the purſuit of it, or, if they do, they are many times ſoon diſcouraged, and drop it, for want of ſufficient reſolution to ſurmount its difficulties. Such, therefore, as either cannot, or do not care to give themſelves the trouble of examining into things themſelves, muſt take up with the repreſentation of others; and it is an eaſe to them to hear the opinion of perſons whom they eſteem wiſer than themſelves. No one loves to be deceived; and thoſe who are fearful of being miſled, are pleaſed to meet with a perſon, in whoſe wiſdom, as they think, they can ſafely truſt. The character of wiſdom therefore is of great ſervice to an orator, ſince the greater part of mankind are ſwayed by authority rather than arguments.

2. But this of itſelf is not ſufficient, unleſs the opinion of *integrity* be joined with it. Nay, ſo far from it, that the greater knowledge and underſtanding a man is ſuppoſed to have, unleſs he likewiſe have the character of an honeſt man, he is often the more ſuſpected. For knowledge without honeſty, is generally thought to diſpoſe a perſon, as well as qualify him, to deceive.

3. And to both theſe qualities the appearance of kindneſs and *benevolence* ſhould likewiſe be added. For though a perſon have the reputation of wiſdom and honeſty, yet if we apprehend he is either not well affected to us, or at leaſt regardleſs of our intereſt, we are in many caſes apt to be jealous of him. Mankind are naturally ſwayed by their affections, and much influenced through love or friendſhip; and therefore nothing has a greater tendency to induce perſons to credit what is ſaid, than intimations of affection and kindneſs. The beſt orators have been always ſenſible, what great influence the expreſſions of kindneſs and

benevolence have upon the minds of others, to induce them to believe the truth of what they ſay; and therefore they frequently endeavour to impreſs them with the opinion of it. Thus Demoſthenes begins his celebrated oration for Cteſiphon. "It is my hearty prayer (ſays he) to all the deities, that this my defence may be received by you with the ſame affection which I have always expreſſed for you and your city." And it is a very fine image of it which we have in Cicero, where, in order to influence the judges in favour of Milo, he introduces him ſpeaking thus, as became a brave man, and a patriot, even upon the ſuppoſition he ſhould be condemned by them: "I bid my fellow citizens adieu; may they continue flouriſhing and proſperous; may this famous city be preſerved, my moſt dear country, however it has treated me; may my fellow citizens enjoy peace and tranquillity without me, ſince I am not to enjoy it with them, though I have procured it for them; I will withdraw, I will be gone."

4. *Modeſty.* It is certain, that what is modeſtly ſpoken, is generally better received than what carries in it an air of boldneſs and confidence. Moſt perſons, though ignorant of a thing, do not care to be thought ſo; and would have ſome deference paid to their underſtanding. But he who delivers himſelf in an arrogant and aſſuming way, ſeems to upbraid his hearers with ignorance, while he does not leave them to judge for themſelves, but dictates to them, and as it were demands their aſſent to what he ſays; which is certainly a very improper method to win upon them. For not a few, when convinced of an error in ſuch a way, will not own it; but will rather adhere to their former opinion, than ſeem forced to think right, when it gives another the opportunity of a triumph. A prudent orator therefore will behave himſelf with modeſty, that he may not ſeem to inſult his hearers; and will ſet things before them in ſuch an engaging manner, as may remove all prejudice either from his perſon or what he aſſerts. But at the ſame time, firmneſs and reſolution is as neceſſary as modeſty, that he may appear to confide in the juſtice and truth of his cauſe. For to ſpeak timorouſly, and with heſitation, deſtroys the credit of what is offered; and ſo far as the ſpeaker ſeems to diſtruſt what he ſays himſelf, he often induces others to do the like.

But, as has been ſaid already, great care is to be taken, that theſe characters do not appear feigned and counterfeit. For what is fictitious can ſeldom be long concealed. And if this be once diſcovered, it makes all that is ſaid ſuſpected, how ſpecious ſoever it may otherwiſe appear.

It is further neceſſary, that the orator ſhould know the world, and be well acquainted with the different tempers and diſpoſitions of mankind. Nor indeed can any one reaſonably hope to ſucceed in this province, without well conſidering the circumſtances of time and place, with the ſentiments and diſpoſitions of thoſe to whom he ſpeaks; which, according to Ariſtotle, may be diſtinguiſhed four ways, as they diſcover themſelves by the ſeveral *affections*, *habits*, *ages*, and *fortunes* of mankind. And each of theſe require a different conduct and manner of addreſs.

The *affections* denote certain emotions of the mind, which, during their continuance, give a great turn to the diſpoſition. For love prompts to one thing, and hatred to another. The like may be ſaid of anger, lenity, and the reſt of them.

Perſons differ likewiſe according to the various *habits* of their mind. So a juſt man is inclined one way, and an unjuſt man another; a temperate man to this, and an intemperate man to the contrary.

And as to the ſeveral *ages* of men, Ariſtotle has deſcribed them very accurately; and how perſons are differently affected in each of them. He divides the lives of men, conſidered as hearers, into three ſtages; youth, middle age, and old age.—Young men, he ſays, have generally ſtrong paſſions, and are very eager to obtain what they deſire; but are likewiſe very mutable, ſo that the ſame thing does not pleaſe them long. They are ambitious of praiſe, and quick in their reſentments. Laviſh of their money, as not having experienced the want of it. Frank and open, becauſe they have not often been deceived; and credulous for the ſame reaſon. They readily hope the beſt, becauſe they have not ſuffered much, and are therefore not ſo ſenſible of the uncertainty of human affairs; for which reaſon, they are likewiſe more eaſily deceived. They are modeſt from their little acquaintance with the world. They love company and cheerfulneſs, from the briſkneſs of their ſpirits. In a word, they generally exceed in what they do; love violently, hate violently, and act in the ſame manner through the reſt of their conduct.—The diſpoſition of old men is generally contrary to the former. They are cautious, and enter upon nothing haſtily; having in the courſe of many years been often impoſed upon; having often erred, and experienced the prevailing corruption of human affairs; for which reaſon they are likewiſe ſuſpicious, and moderate in their affections either of love or hatred. They purſue nothing great and noble, and regard only the neceſſaries of life. They love money; having learnt by experience the difficulty of getting it, and how eaſily it is loſt. They are fearful, which makes them provident. Commonly full of complaints, from bodily infirmities, and a deficiency of ſpirits. They pleaſe themſelves rather with the memory of what is paſt, than any future proſpect; having ſo ſhort a view of life before them, in compariſon of what is already gone: for which reaſon alſo, they love to talk of things paſt; and prefer them to what is preſent, of which they have but little reliſh, and know they muſt ſhortly leave them. They are ſoon angry, but not to exceſs. Laſtly, they are compaſſionate, from a ſenſe of their own infirmities, which makes them think themſelves of all perſons moſt expoſed.—Perſons of a middle age, betwixt theſe two extremes, as they are freed from the raſhneſs and temerity of youth, ſo they have not yet ſuffered the decays of old age. Hence in every thing they generally obſerve a better conduct. They are neither ſo haſty in their aſſent as the one, nor ſo minutely ſcrupulous as the other, but weigh the reaſons of things. They regard a decency in their actions; are careful and induſtrious; and as they undertake what appears juſt and laudable upon better and more deliberate conſideration than young perſons, ſo they purſue them with more vigour and reſolution than thoſe who are older.

As to the different *fortunes* of mankind, they may be conſidered as noble, rich, or powerful; and the contrary to theſe.—Thoſe of high birth, and noble extraction, are generally very tender of their honour, and ambitious to increaſe it; it being natural for all perſons to deſire an addition to thoſe advantages, of which they find themſelves themſelves already poſſeſſed. And they are apt to conſider all others as much their inferiors, and therefore expect great regard and deference ſhould be ſhewn them.—Riches, when accompanied with a generous temper, command reſpect from the opportunities they give of being uſeful to others; but they uſually elate the mind, and occaſion pride. For as money is commonly ſaid to command all things, thoſe who are poſſeſſed of a large ſhare of it, expect others ſhould be at their beck; ſince they enjoy that which all deſire, and which moſt perſons make the main purſuit of their lives to obtain.—But nothing is more apt to ſwell the mind than power. This is what all men naturally covet, even when perhaps they would not uſe it. But the views of ſuch perſons are generally more noble and generous, than of thoſe who only purſue riches and the heaping up of money. A ſtate contrary to theſe gives a contrary turn of mind; and in lower life, perſons diſpoſitions uſually differ according to their ſtation and circumſtances. A citizen and a courtier, a merchant and a ſoldier, a ſcholar and a peaſant, as their purſuits are different, ſo is generally their turn and diſpoſition of mind.

It is the orator's buſineſs, therefore, to conſider theſe ſeveral characters and circumſtances of life, with the different bias and way of thinking they give to the mind; that he may ſo conduct himſelf in his behaviour and manner of ſpeaking, as will render him moſt acceptable, and gain him the good eſteem of thoſe to whom he addreſſes.

CHAP. VI. *Of the Paſſions.*

25 As it is often highly neceſſary for the orator, ſo it requires his greateſt ſkill, to engage the paſſions in his intereſt. Quintilian calls this *the ſoul and ſpirit of his art.* And, doubtleſs, nothing more diſcovers its empire over the minds of men, than this power to excite, appeaſe, and ſway their paſſions, agreeably to the deſign of the ſpeaker. Hence we meet with the characters of *admirable, divine,* and other ſplendid titles, aſcribed to eloquence by ancient writers. It has indeed been objected by ſome, that whatever high encomiums may be given of this art by the admirers of it, it is however diſingenuous to deceive and impoſe upon mankind, as thoſe ſeem to do, who, by engaging their paſſions, give a bias to their minds, and take them off from the conſideration of the truth; whereas every thing ſhould be judged of from the reaſons brought to ſupport it, by the evidence of which it ought to ſtand or fall. But in anſwer to this, it may be conſidered, that all fallacy is not culpable. We often deceive children for their good; and phyſicians ſometimes impoſe on their patients, to come at a cure. And why, therefore, when perſons will not be prevailed with by reaſon and argument, may not an orator endeavour, by engaging their paſſions, to perſuade them to that which is for their advantage? Beſides, Quintilian makes it a neceſſary qualification of an orator, that he be an honeſt man, and one who will not abuſe his art. But ſince thoſe of a contrary character will leave no methods untried in order to carry their point, it is requiſite for thoſe who deſign well, to be acquainted with all their arts, without which they will not be a match for them; as in military affairs it is highly advantageous for the general of an army to get himſelf informed of all the deſigns and ſtratagems of the enemy, in order to counteract them. Indeed this part of oratory is not neceſſary at all times, nor in all places. The better prepared perſons are to conſider truth, and act upon the evidence of it, the leſs occaſion there appears for it. But the greater part of mankind, either do not duly weigh the force of arguments, or refuſe to act agreeably to their evidence. And where this is the caſe, that perſons will neither be convinced by reaſon, nor moved by the authority of the ſpeaker, the only way left to put them upon action, is to engage their paſſions. For the paſſions are to the mind, what the wind is to a ſhip: they move, and carry it forward; and he who is without them, is in a manner without action, dull and lifeleſs. There is nothing great or noble to be performed in life, wherein the paſſions are not concerned. The Stoics, therefore, who were for eradicating the paſſions, both maintained a thing in itſelf impoſſible, and which, if it was poſſible, would be of the greateſt prejudice to mankind. For while they appeared ſuch zealous aſſertors of the government of reaſon, they ſcarce left it any thing to govern; for the authority of reaſon is principally exerciſed in ruling and moderating the paſſions, which, when kept in a due regulation, are the ſprings and motives to virtue. Thus hope produces patience, and fear induſtry; and the like might be ſhewn of the reſt. The paſſions therefore are not to be extirpated, as the Stoics aſſerted, but put under the direction and conduct of reaſon. Indeed where they are ungovernable, and inſtead of obeying command, they are, as ſome have fitly called them, *diſeaſes of the mind;* and frequently hurry men into vice, and the greateſt misfortunes of life: Juſt as the wind, when it blows moderately, carries on the ſhip; but if it be too boiſterous and violent, may overſet her. The charge therefore brought againſt this art, for giving rules to influence the paſſions, appears groundleſs and unjuſt; ſince the proper uſe of the paſſions is, not to hinder the exerciſe of reaſon, but to engage men to act agreeably to reaſon. And if an ill uſe be ſometimes made of this, it is not the fault of the art, but of the artiſt.

We ſhall here conſider the paſſions, as they may be ſeparately referred, either to *demonſtrative, deliberative,* or *judicial* diſcourſes; though they are not wholly confined to any of them.

1. To the *demonſtrative* kind, we may refer *joy* and *ſorrow, love* and *hatred, emulation* and *contempt.*

Joy is an elation of the mind, ariſing from a ſenſe of ſome preſent good. Such a reflection naturally creates a pleaſant and agreeable ſenſation, which ends in a delightful calm and ſerenity. This is heightened by a deſcription of former evils, and a compariſon between them and the preſent felicity. Thus Cicero endeavours to excite in the minds of his fellow-citizens the higeſt ſenſe of joy and delight at Catiline's departure from Rome, by repreſenting to them the imminent danger which threatened both them and the city while he continued among them.

Sorrow, one the contrary, is an uneaſineſs of mind ariſing from a ſenſe of ſome preſent evil. This paſſion has generally a place in funeral diſcourſes. And it may be heightened, like the former, by compariſon, when any paſt happineſs is ſet in oppoſition to a preſent calamity. Hence Cicero aggravates the ſorrow at Rome occaſioned by the death of Metellus, from his character, and great ſervices to the public, while living.

Love excites us to eſteem one another for ſome excellency, and to do him all the good in our power. It is diſtinguiſhed from *friendſhip*, which is mutual; and therefore love may continue where friendſhip is loſt: that is, the affection may remain on one ſide. And when we aſſiſt a perſon from no other motive but to do him a kindneſs, Ariſtotle calls this *good-will.* Love takes its riſe from a variety of cauſes. Generoſity, benevolence, integrity, gratitude, courteſy, and other ſocial virtues, are great incitements to love any one endued with ſuch qualities. And perſons generally love thoſe who are of a like diſpoſition with themſelves and purſue the ſame views. It is therefore the chief art of a flatterer to ſuit himſelf in every thing to the inclination of the perſon whoſe good graces he courts. When the orator would excite this affection towards any perſon, it is proper to ſhew, that he is poſſeſſed of at leaſt ſome, if not all, of theſe agreeable qualities. When the conſpirators with Catiline were to be brought to juſtice, Cicero was very ſenſible of the envy he ſhould contract on that account, and how neceſſary it was for him to ſecure the love of the Roman ſenate for his ſupport and protection in that critical juncture. And this he endeavours to do in his fourth oration againſt Catiline, by repreſenting to them, in the moſt pathetic manner, that all the labours he underwent, the difficulties he conflicted with, and the dangers to which he was expoſed on that account, were not for his own ſake, but for their ſafety, quiet, and happineſs.

Hatred is oppoſed to love, and produced by the contrary diſpoſitions. And therefore perſons hate thoſe, who never did them any injury, from the ill opinion they have of their baſe and vitious inclinations. So that the way to excite this paſſion is, by ſhewing that any one has committed ſome heinous fact with an ill intent. And the more nearly affected perſons are by ſuch actions, in what they account of the greateſt concern, the higher in proportion their hatred riſes. Since life therefore is eſteemed the moſt valuable good, Cicero endeavours to render Mark Anthony odious to the citizens of Rome, by deſcribing his cruelty.

Emulation is a diſquiet, occaſioned by the felicity of another, not becauſe he enjoys it, but becauſe we deſire the like for ourſelves. So that this paſſion is in itſelf good and laudable, as it engages men to purſue thoſe things which are ſo. For the proper objects of emulation are any advantages of mind, body, or fortune, acquired by ſtudy or labour.

Emulation therefore is excited by a lively repreſentation of any deſirable advantages which appear to be attainable, from the example of others who are or have been poſſeſſed of them. But where the felicity of another occaſions an uneaſineſs, not from the want of it, but becauſe he enjoys it, this paſſion is called *envy*, which the ancients deſcribe as an hideous monſter, feeding upon itſelf, and being its own tormentor. Ariſtotle obſerves, that it moſt uſually affects ſuch perſons as were once upon a level with thoſe they envy. For moſt men naturally think ſo well of themſelves, that they are uneaſy to ſee thoſe who were formerly their equals, advanced above them. But, as this is a baſe and vitious paſſion, the orator is not to be informed how to excite it, but how to leſſen or remove it. And the method preſcribed by Cicero for this purpoſe is, to ſhew that the things, which occaſioned it, have not happened to the envied perſon undeſervedly, but are the juſt reward of his induſtry or virtue; that he does not ſo much convert them to his own profit or pleaſure, as to the benefit of others; and that the ſame pains and difficulties are neceſſary to preſerve them, with which they were at firſt acquired.

Contempt is oppoſed to *emulation*, and ariſes from miſconduct in things not of themſelves vitious: As where a perſon either acts below his ſtation and character, or affects to do that for which he is not qualified. Thus Cicero endeavours to expoſe Cæcilius, and bring him into contempt of the court, for pretending to rival him in the accuſation of Verres, for which he was altogether unfit.

2. To *deliberative* diſcourſes may be referred *fear*, *hope*, and *ſhame*.

Fear ariſes from the apprehenſion of ſome great and impending evil. For the greateſt evils, while they appear at a diſtance, do not much affect us. Such perſons occaſion fear, who are poſſeſſed with power, eſpecially if they have been injured, or apprehend ſo. Likewiſe thoſe who are addicted to do injuries, or who bear us an ill will. And the examples of others, who have ſuffered in a like caſe, or from the ſame perſons, help to excite fear. From the circumſtances therefore either of the thing, or perſon, it will not be difficult for the orator to offer ſuch arguments as may be proper to awaken this paſſion. So Demoſthenes, when he would perſuade the Athenians to put themſelves in a condition of defence againſt king Philip, enumerates the ſeveral acts of hoſtility already committed by him againſt the neighbouring ſtates. And becauſe mens private concerns generally more affect them than what relates to the public; it is proper ſometimes to ſhew the neceſſary connection theſe have with each other, and how the ruin of one draws the other after it.

The contrary paſſion to *fear* is *hope*; which ariſes, either from a proſpect of ſome future good, or the apprehenſion of ſafety from thoſe things which occaſion our fear. Young perſons are eaſily induced to hope the beſt, from the vigour of their ſpirits. And thoſe who have eſcaped former dangers, are encouraged to hope for the like ſucceſs for the future. The examples of others alſo, eſpecially of wiſe and conſiderate men, have often the ſame good effect. To find them calm and ſedate when expoſed to the like dangers, naturally creates confidence and the hopes of ſafety. But nothing gives perſons that firmneſs and ſteadineſs of mind, under the apprehenſion of any difficulties, as a conſciouſneſs of their own integrity and innocence. Let dangers come from what quarter they will, they are beſt prepared to receive them. They can calmly view an impending tempeſt, obſerve the way of its approach, and prepare themſelves in the beſt manner to avoid it. In Cicero's oration for the Manilian law, he encourages the Roman citizens to hope for ſucceſs againſt Mithridates, if they choſe Pompey for their general, from the many inſtances of his former ſucceſſes, which he there enumerates.

Shame ariſes from the apprehenſion of thoſe things that hurt a perſon's character. *Modeſty* has been wiſely implanted in mankind by the great Author of nature, as a guardian of virtue, which ought for this reaſon to be cheriſhed with the greateſt care; becauſe, as Seneca has well obſerved, "if it be once loſt, it is ſcarce ever to be recovered." Therefore the true cauſe or foundation of ſhame is any thing baſe or vitious; for this wounds the character, and will not bear reflection. And he muſt arrive at no ſmall degree of inſenſibility, who can ſtand againſt ſuch a charge, if he be conſcious to himſelf that it is juſt. Therefore, to deter perſons from vitious actions, or to expoſe them for the commiſſion of them, the orator endeavours to ſet them in ſuch a light as may moſt awaken this paſſion, and give them the greateſt uneaſineſs by the reflection. And becauſe the bare repreſentation of the thing itſelf is not always ſufficient for this purpoſe; he ſometimes enforces it by enlarging the view, and introducing thoſe perſons as witneſſes of the fact for whom they are ſuppoſed to have the greateſt regard. Thus, when ſome of the Athenians, in an arbitration about certain lands which had been referred to them by the contending parties, propoſed it as the ſhorteſt way of deciding the controverſy, to take the poſſeſſion of them into their own hands; Cydias, a member of the aſſembly, to diſſuade them from ſuch an unjuſt action, deſired them to imagine themſelves at that time in the general aſſembly of the ſtates of Greece (who would all hear of it ſhortly), and then conſider how it was proper to act. But where perſons labour under an exceſs of modeſty, which prevents them from exerting themſelves in things fit and laudable, it may ſometimes be neceſſary to ſhew, that it is faulty and ill grounded. On the other hand, *immodeſty*, or impudence, which conſiſts in a contempt of ſuch things as affect the reputation, can never be too much diſcouraged and expoſed. And the way of doing this is, to make uſe of ſuch arguments as are moſt proper to excite ſhame. We have a very remarkable inſtance of it in Cicero's ſecond Philippic, wherein he affixes this character upon Mark Anthony, through every ſcene of his life.

3. To *judicial* diſcourſes, may be referred *anger* and *lenity*, *pity* and *indignation*.

Anger is a reſentment, occaſioned by ſome affront, or injury, done without any juſt reaſon. Now men are more inclined to reſent ſuch a conduct, as they think they leſs deſerve it. Therefore perſons of diſtinction and figure, who expect a regard ſhould be paid to their character, can the leſs bear any indications of contempt. And thoſe who are eminent in any profeſſion or faculty, are apt to be offended, if reflections are caſt either upon their reputation or art. Magiſtrates alſo, and perſons in public ſtations, ſometimes think it incumbent on them to reſent indignities, for the ſupport of their office. But nothing ſooner inflames this paſſion, than if good ſervices are rewarded with ſlights and neglect. The inſtance of Narſites, the Roman general, is remarkable in this kind; who, after he had been ſucceſsful in his wars with the Goths, falling under the diſpleaſure of the emperor Juſtin, was removed from the government of Italy, and received by the empreſs with this taunt, *That he muſt be ſent to weave among the girls*; which ſo provoked him, that he ſaid he would weave ſuch a web as they ſhould never be able to unravel. And accordingly, he ſoon after brought down the Longobards, a people of Germany, into Italy; where they ſettled themſelves in that part of the country, which from them is now called *Lombardy*. The time and place in which an injury was done, and other circumſtances that attended it, may likewiſe contribute very much to heighten the fact. Hence Demoſthenes, in his oration againſt Midias, endeavours to aggravate the injury of being ſtruck by him, both as he was then a magiſtrate, and becauſe it was done at a public feſtival. From hence it appears, that the perſons, who moſt uſually occaſion this paſſion, are ſuch as neglect the rules of decency, contemn and inſult others, or oppoſe their inclinations; as likewiſe the ungrateful, and thoſe who violate the ties of friendſhip, or requite favours with injuries. But when the orator endeavours to excite anger, he ſhould be careful not to exceed due bounds in aggravating the charge, leſt what he ſays, appear rather to proceed from prejudice, than a ſtrict regard to the demerit of the action.

Lenity is the remiſſion of anger. The deſigns of mens actions are principally to be regarded; and therefore what is done ignorantly, or through inadvertency, is ſooner forgiven. Alſo to acknowledge a fault, ſubmit, and aſk pardon, are the ready means to take off reſentment. For a generous mind is ſoon cooled by ſubmiſſion. Beſides, he who repents of his fault, does really give the injured party ſome ſatisfaction, by puniſhing himſelf; as all repentance is attended with grief and uneaſineſs of mind, and this is apt very much to abate the deſire of revenge. As, on the contrary, nothing is more provoking, than when the offender either audaciouſly juſtifies the fact, or confidently denies it. Men are likewiſe wont to lay aſide their reſentment, when their adverſaries happen by ſome other means to ſuffer what they think a ſufficient ſatisfaction. Laſtly, eaſy circumſtances, a lucky incident, or any thing which gives the mind a turn to mirth and pleaſure, has a natural tendency to remove anger. For anger is accompanied with pain and uneaſineſs, which very ill ſuit joy and cheerfulneſs. The orator therefore, in order to aſſuage and pacify the minds of his auditors, will endeavour to leſſen their opinion of the fault, and by that means to take off the edge of their reſentment. And to this purpoſe, it will be proper either to repreſent that the thing was not deſigned, or that the party is ſorry for it; or to mention his former ſervices; as alſo to ſhew the credit and reputation which will be gained by a generous forgiveneſs. And this laſt topic is very artfully wrought up by Cicero, in his addreſs to Cæſar, in favour of Ligarius.

Pity ariſes from the calamities of others, by reflecting, that we ourſelves are liable to the like misfortunes. So that evils, conſidered as the common lot of human nature, are principally the cauſe of pity. And this makes the difference between *pity* and *good-will*, which ariſes merely from a regard to the circumſtances of thoſe who want our aſſiſtance. But conſidering the uncertainty of every thing about us, he muſt ſeem in a manner diveſted of humanity, who has no compaſſion for the calamities of others; ſince there is no affliction which happens to any man, but either that, or ſome other as great, may fall upon himſelf. But thoſe perſons are generally ſooneſt touched with this paſſion, who have met with misfortunes themſelves. And by how much greater the diſtreſs is, or the perſon appears leſs deſerving it, the higher pity does it excite: for which reaſon, perſons are generally moſt moved at the misfortunes of their relations and friends, or thoſe of the beſt figure and character. The orator therefore, in order to excite the greater pity, will endeavour to heighten the idea of the calamity, from the ſeveral circumſtances both of the thing itſelf and the perſon who labours under it. A fine example of this may be ſeen in Cicero's defence of Muræna, *cap.* 40. &c.

Indignation, as oppoſed to *pity*, is an uneaſineſs at the felicity of another who does not ſeem to deſerve it. But this reſpects only external advantages, ſuch as riches, honours, and the like; for virtues cannot be the object of this paſſion. Ariſtotle therefore ſays, "that pity and indignation are generally to be found in the ſame perſons, and are both evidences of a good diſpoſition." Now the orator excites this paſſion, by ſhewing the perſon to be unworthy of that felicity which he enjoys. And as, in order to move compaſſion, it is ſometimes of uſe to compare the former happy ſtate of the perſon with his preſent calamity; ſo here, the greater indignation is raiſed, by comparing his former mean circumſtances with his preſent advancement: as Cicero does in the caſe of Vatinius.

Theſe are the paſſions with which an orator is principally concerned. In addreſſing to which, not only the greateſt warmth and force of expreſſion is often neceſſary; but he muſt likewiſe firſt endeavour to impreſs his own mind with the ſame paſſion he would excite in others, agreeably to that of Horace:

> My grief with others juſt proportion bears;
> To make me weep, you muſt be firſt in tears.

PART II. OF DISPOSITION.

As *Invention* ſupplies the orator with neceſſary materials, ſo *Diſpoſition* directs him how to place them in the moſt proper and ſuitable order. Diſpoſition therefore, conſidered as a part of oratory, naturally follows invention. And what is here chiefly intended by it is, the placing the ſeveral parts of a diſcourſe in a juſt method and dependence upon one another.

Writers are not all agreed in determining the parts of an oration; though the difference is rather in the manner of conſidering them, than in the things themſelves. But Cicero, whom we ſhall here follow, mentions ſix, namely, *Introduction*, *Narration*, *Propoſition*, *Confirmation*, *Confutation*, and *Concluſion*.

CHAP. I. *Of the Introduction.*

26 The deſign of this is to prepare the minds of the hearers for a ſuitable reception of the remaining parts that are to follow. And for this end, three things are requiſite; that the orator gain the *good opinion* of his hearers, that he ſecure their *attention*, and give them ſome *general notion* of his ſubject.

1. *Good opinion.* When the orator introduces his diſcourſe with his own perſon, he will be careful to do it with modeſty, and ſeem rather to extenuate his virtues and abilities, than to magnify them. And where the nature of the ſubject may ſeem to require it, he will endeavour to ſhew, that ſome juſt and good reaſon induced him to engage in it. We have a very fine example of this in Cicero's oration for the poet Aulus Licinius Archias, which begins thus: "If I have any natural genius, which I am ſenſible how ſmall it is; or any ability in ſpeaking, wherein I own I have been very converſant; or any ſkill acquired from the ſtudy and precepts of the beſt arts, to which my whole life has been devoted: this Aulus Licinius has, in a particular manner, a right to demand of me the fruit of all theſe things. For as far back as I can remember, and call to mind what paſſed in my youth, to the preſent time, he has been my chief adviſer and encourager both to undertake and purſue this courſe of ſtudies." When the orator ſets out with the perſons of thoſe to whom the diſcourſe is made, it is not unuſual to commend them for their virtues, and thoſe eſpecially which have a more immediate relation to the preſent ſubject. Thus Cicero begins his oration of thanks for the pardon of Marcellus, with an encomium upon the mildneſs, clemency, and wiſdom of Cæſar, to whom it was addreſſed. But ſometimes he expreſſes his gratitude for paſt favours; as Cicero has done in his orations, both to the people and ſenate of Rome, after his return from baniſhment. And at other times he declares his concern for them and their intereſt; in which manner Cicero begins his fourth oration againſt Catiline, which was made in the ſenate. "I perceive (ſays he) that all your countenances and eyes are turned on me; I perceive that you are ſolicitous, not only for your own danger, and that of the ſtate, but for mine likewiſe, if that ſhould be removed. Your affection for me is pleaſant in misfortunes, and grateful in ſorrow; but I adjure you to lay it aſide, and, forgetting my ſafety, conſider yourſelves and your children." But in judicial caſes, both the character of the perſon whoſe cauſe he eſpouſes, and that of the adverſe party likewiſe, furniſhes the orator with arguments for exciting the good-will of his hearers: The former, by commemorating his virtues, dignity, or merits, and ſometimes his misfortunes and calamities. So Cicero in his defence of Flaccus, begins his oration in commending him on the account of his ſervices done to the public, the dignity of his family, and his love to his country. And Demoſthenes, in his oration againſt Midias, ſets out with a recital of his vices, in order to recommend his own cauſe to the favourable opinion of the court.

2. *Attention.* On this head, Cicero ſays, "We ſhall be heard attentively by one of theſe three things; if we propoſe what is great, neceſſary, or for the in-

tereſt of thoſe to whom the diſcourſe is addreſſed." So that, according to him, the topics of attention are much the ſame with thoſe of good opinion, when taken from the ſubject. And indeed, people are naturally led to attend either to thoſe things or perſons of which they have entertained a favourable opinion. But in order to gain this point, the orator ſometimes thinks it proper to requeſt the attention of his audience. Thus Cicero, in his defence of Cluentius, after having ſhewn the heinouſneſs of the charge againſt him, concludes his introduction in the following manner, ſpeaking to the judges: "Wherefore I intreat, that while I briefly and clearly reply to a charge of many years ſtanding, you will, according to your uſual cuſtom, give me a kind and attentive hearing." And again, in his ſecond Philippic, addreſſing himſelf to the ſenate: "But as I muſt ſay ſomething for myſelf, and many things againſt Mark Anthony; one of theſe I beg of you, that you will hear me kindly, while I ſpeak for myſelf; and the other I will undertake for, that when I ſpeak againſt him, you ſhall hear me with attention." But though the introduction be the moſt uſual and proper place for gaining attention, yet the orator finds it convenient ſometimes to quicken and excite his hearers in other parts of his diſcourſe, when he obſerves they flag, or has ſomething of moment to offer.

3. Some *general account* of the ſubject of the diſcourſe. This is always neceſſary, which the two others are not. And therefore it muſt be left to the prudence of the orator, when to uſe or omit them, as he ſhall judge proper, from the nature of his diſcourſe, the circumſtances of his hearers, and how he ſtands with them. But ſome account of the ſubject is what cannot be neglected. For every one expects to be ſoon informed of the deſign of the ſpeaker, and what he propoſes to treat of. Nor when they are all made uſe of, is it neceſſary they ſhould always ſtand in the order we have here placed them. Cicero ſometimes enters immediately upon his ſubject, and introduces the other heads afterwards. As in his third oration againſt Catiline, made to the body of the Roman people, which begins thus: "You ſee that the ſtate, all your lives, eſtates, fortunes, wives and children, and this ſeat of the greateſt empire, the moſt flouriſhing and beautiful city, having by the favour of heaven towards you, and my labours, counſels, and dangers, been this day reſcued from fire and ſword and the very jaws of deſtruction, are preſerved and reſtored to you.' And then he proceeds to recommend himſelf to their eſteem and benevolence, from the conſideration of theſe benefits.

Theſe are the heads which commonly furniſh matter for this part of a diſcourſe. But orators often take occaſion from the time, place, largeneſs of the aſſembly, or ſome other proper circumſtance, to compliment their hearers, recommend themſelves, or introduce the ſubject upon which they are about to treat. Inſtances of each of theſe may be met with in ſeveral of Cicero's orations. And ſometimes they ſet out with ſome compariſon, ſimilitude, or other ornament, which they accommodate to the occaſion of their diſcourſe. Thus Iſocrates enters upon his celebrated panegyric in praiſe of his countrymen the Athenians, with the following compariſon: "I have often wondered, what could be their deſign, who brought together theſe aſſemblies, and inſtituted the gymnical ſports, to propoſe ſo great rewards for bodily ſtrength; and to vouchſafe no honour to thoſe, who applied their private labours to ſerve the public, and ſo cultivated their minds as to be ſerviceable to others, to whom they ought to have ſhewn greater regard. For although the ſtrength of a champion was doubled, no benefit would from thence accrue to others; but all enjoy the prudence of one man, who will hearken to his advice." In ſome caſes, orators have recourſe to a more covert and artful way of opening their ſubject, endeavour to remove jealouſies, apologize for what they are about to ſay, and ſeem to refer it to the candour of the hearers to judge of it as they pleaſe. Cicero appears to have been a perfect maſter of this art, and uſed it with great ſucceſs. Thus his ſeventh Philippic, where he ſeems to expreſs the greateſt concern, leſt what he was about to ſay ſhould give any offence to the ſenate to whom he was ſpeaking: "I," ſays he, "who always declared for peace, and to whom peace among ourſelves, as it is wiſhed for by all good men, was in a particular manner deſirable; who have employed all my induſtry in the forum, in the ſenate, and in the defence of my friends, whence I have arrived to the higeſt honours, a moderate fortune, and what reputation I enjoy; I therefore, who owe what I am to peace, and without it could not have been the perſon I am, be that what it will, for I would arrogate nothing to myſelf; I ſpeak with concern and fear, how you will receive what I am going to ſay; but I beg and intreat you, from the great regard I have always expreſſed for the ſupport and advancement of your honour, that if any thing ſaid by me ſhould at firſt appear harſh or unfit to be received, you will notwithſtanding pleaſe to hear it without offence, and not reject it till I have explained myſelf: I then, for I muſt repeat it again, who have always approved of peace, and promoted it, am againſt a peace with Mark Antony." This is called *inſinuation;* and may be neceſſary, where a cauſe is in itſelf doubtful, or may be thought ſo from the received notions of the hearers, or the impreſſions already made upon them by the contrary ſide. An honeſt man would not knowingly engage in a bad cauſe; and yet, though prevailing prejudice, that may be ſo eſteemed which is not ſo in itſelf. In theſe caſes, therefore, great caution and prudence are neceſſary to give ſuch a turn to things, and place them in that view, as may be leaſt liable to offence. And becauſe it ſometimes happens, that the hearers are not ſo much diſpleaſed at the ſubject as the perſon, Quintilian's rule ſeems very proper, when he ſays: "If the ſubject diſpleaſes, the character of the perſon ſhould ſupport it; and when the perſon gives offence, he ſhould be helped by the cauſe."

CHAP. II. *Of Narration.*

THE orator having prepared his hearers to receive 27
his diſcourſes with candour and attention, and acquainted them with his general deſign in the introduction, before he proceeds directly to his ſubject, often finds it neceſſary to give ſome account of what preceded, accompanied, or followed upon it. And this he does in order to enlarge the view of the particular

cular point in diſpute, and place it in a clearer light. This is called *narration*; which is a recital of ſomething done, in the order and manner in which it was done. Hence it is eaſy to perceive, what thoſe things are which properly enter into a narration. And ſuch are the cauſe, manner, time, place, and conſequences of an action; with the temper, fortune, views, ability, aſſociates, and other circumſtances of thoſe concerned in it. Not that each of theſe particulars is neceſſary in every narration; but ſo many of them at leaſt, as are requiſite to ſet the matter in a juſt light, and make it appear credible. Beſides, in relating a fact, the orator does not content himſelf with ſuch an account of it as is barely ſufficient to render what he ſays intelligible to his hearers; but deſcribes it in ſo ſtrong and lively a manner, as may give the greateſt evidence to his relation, and make the deepeſt impreſſion upon their minds. And if any part of it appears at preſent leſs probable, he promiſes to clear up and remove any remaining doubts in the progreſs of his diſcourſe. For the foundation of his reaſoning afterwards is laid in the narration, from whence he takes his arguments for the confirmation. And therefore it is a matter of no ſmall importance, that this part be well managed; ſince the ſucceſs of the whole diſcourſe ſo much depends upon it.

There are four properties required in a good narration; that it be ſhort, clear, probable, and pleaſant.

1. The brevity of a narration is not to be judged of barely from its length: for that may be too long, which contains but a little; and that too ſhort, which comprehends a great deal. Wherefore this depends upon the nature of the ſubject, ſince ſome things require more words to give a juſt repreſentation of them, and others fewer. That may properly therefore be called a *ſhort narration*, which contains nothing that could well have been omitted, nor omits any thing which was neceſſary to be ſaid. Now, in order to avoid both theſe extremes, care ſhould be taken not to go further back in the account of things, nor to trace them down lower, than the ſubject requires; to ſay that only in the general, which does not need a more particular explication; not to aſſign the cauſes of things, when it is enough to ſhew they were done; and to omit ſuch things as are ſufficiently underſtood, from what either preceded, or was conſequent upon them. But the orator ſhould be careful, leſt, while he endeavours to avoid prolixity, he run into obſcurity. Horace was very ſenſible of this danger, when he ſaid:

> By ſtriving to be ſhort, I grow obſcure.

2. *Perſpicuity*. This may juſtly be eſteemed the chief excellency of language. For as the deſign of ſpeech is to communicate our thoughts to others, that muſt be its greateſt excellence, which contributes moſt to this end; and that, doubtleſs, is perſpicuity. As perſpicuity therefore is requiſite in all diſcourſe, ſo it is particularly ſerviceable in a narration, which contains the ſubſtance of all that is to be ſaid afterwards. Wherefore, if this be not ſufficiently underſtood, much leſs can thoſe things which receive their light from it. Now the following things render a narration clear and plain: Proper and ſignificant words, whoſe meaning is well known and determined; ſhort ſentences, though full and explicit, whoſe parts are not perplexed, but placed in their juſt order; proper particles to join the ſentences, and ſhew their connection and dependance on each other; a due reward to the order of time, and other circumſtances neceſſary to be expreſſed; and laſtly, ſuitable tranſitions.

3. *Probability*. Things appear probable, when the cauſes aſſigned for them appear natural; the manner in which they are deſcribed is eaſy to be conceived; the conſequences are ſuch as might be expected; the characters of the perſons are juſtly repreſented; and the whole account is well atteſted, conſiſtent with itſelf, and agreeable to the general opinion. Simplicity likewiſe in the manner of relating a fact, as well as in the ſtyle, without any reſerve or appearance of art, contributes very much to its credibility. For truth loves to appear naked and open, ſtript of all colouring or diſguiſe. The conſpiracy of Catiline was ſo daring and extravagant, that no one, but ſuch a deſperado, could ever have undertaken it with any hopes of ſucceſs. However, Cicero's account of it to the ſenate was ſo full and exact, and ſo well ſuited to the character of the perſon, that it preſently gained credit. And therefore, when, upon the concluſion of Cicero's ſpeech, Catiline, who was preſent, immediately ſtood up, and deſired they would not entertain ſuch hard thoughts of his, but conſider how much his family had always been attached to the public intereſt, and the great ſervices they had done the ſtate; their reſentments roſe ſo high, that he could not be heard: upon which he immediately left the city, and went to his aſſociates.

4. The laſt thing required in a narration is, that it be *pleaſant* and *entertaining*. And this is more difficult, becauſe it does not admit of that accurate compoſition, and pompous dreſs, which delight the ear, and recommend ſome other parts of a diſcourſe. For it certainly requires no ſmall ſkill in the ſpeaker, while he endeavours to expreſs every thing in the moſt natural, plain, and eaſy manner, not to grow flat and tireſome. For Quintilian's remark is very juſt, that, "the moſt experienced orators find nothing in eloquence more difficult, than what all, who hear it, fancy they could have ſaid themſelves." And the reaſon of this ſeems very obvious. For as all art is an imitation of nature, the nearer it reſembles that, the more perfect it is in its kind. Hence unexperienced perſons often imagine that to be eaſieſt, which ſuits beſt with thoſe natural ideas to which they have been accuſtomed; till, upon trial, they are convinced of their miſtake. Wherefore, to render this part of a diſcourſe pleaſant and agreeable, recourſe muſt be had to variety, both in the choice of words, and turns of the expreſſion. And therefore queſtions, admirations, interlocutions, imagery, and other familiar figures, help very much to diverſify and enliven a narration, and prevent it from becoming dull and tedious, eſpecially when it is carried on to any conſiderable length.

Having given a brief account of the nature and properties of a narration, we ſhall now proceed to conſider the uſes of it.

Laudatory orations are uſually as it were a ſort of continued narration, ſet off and adorned with florid language and fine images proper to grace the ſubject, which is naturally ſo well fitted to afford pleaſure and entertainment. Wherefore a ſeparate narration is more ſuited to *deliberative* and *judicial* diſcourſes. In Cicero's oration for the Manilian law (which is of the former kind), the deſign of the narration is to ſhew the Roman people the neceſſity of giving Pompey the command of the army againſt king Mithridates, by repreſenting the nature of that war, which is done in the following manner. "A great and dangerous war (ſays he) threatens your revenues and allies from two very powerful kings, Mithridates and Tigranes; one of whom not being purſued after his defeat, and the other provoked, they think they have an opportunity to ſeize Aſia. Letters are daily brought from thoſe parts to worthy gentlemen of the equeſtrian order, who have large concerns there in farming your revenues: they acquaint me, as friends, with the ſtate of the public affairs, and danger of their own; that many villages in Bithynia, which is now your province, are burnt down; that the kingdom of Ariobarzanes, which borders upon your revenues, is entirely in the enemy's power; that Lucullus, after ſeveral great victories, is withdrawn from the war; that he who ſucceeds him is not able to manage it; that all the allies and Roman citizens wiſh and deſire the command of that war may be given to one particular perſon; and that he alone, and no other, is dreaded by the enemies. You ſee the ſtate of the caſe; now conſider what ought to be done." Here is an unhappy ſcene of affairs, which ſeemed to call for immediate redreſs. The cauſes and reaſons of it are aſſigned in a very probable manner, and the account well atteſted by perſons of character and figure. And what the conſequences would be, if not timely prevented, no one could well be ignorant. The only probable remedy ſuggeſted in general is, the committing that affair to one certain perſon, which he afterwards ſhews at large could be no other than Pompey. But in Cicero's defence of Milo, (which is of the *judicial* kind), the deſign of the narration, which is greatly commended by Quintilian, is to prove, that, in the combat between Clodius and Milo, the former was the aggreſſor. And in order to make this appear, he gives a ſummary account of the conduct of Clodius the preceding year; and from the courſe of his actions and behaviour, ſhews the inveterate hatred he bore to Milo, who obſtructed him in his wicked deſigns. For which cauſe he had often threatened to kill him, and given out that he ſhould not live beyond ſuch a time: and accordingly he went from Rome without any other apparent reaſon, but that he might have an opportunity to attack him in a convenient place near his own houſe, by which he knew Milo was then obliged to paſs. Milo was in the ſenate that day, where he ſtaid till they broke up, then went home, and afterwards ſet forward on his journey. When he came to the place in which he was to be aſſaulted, Clodius appeared every way prepared for ſuch a deſign, being on horſeback, and attended with a company of deſperate ruffians ready to execute his commands; whereas Milo was with his wife in a chariot, wrapped up in his cloak, and attended with ſervants of both ſexes. Theſe were all circumſtances which preceded the fact. And as to the action itſelf, with the event of it, the attack, as Cicero ſays, was begun by the attendants of Clodius from an higher ground, who killed Milo's coachman: upon which Milo, throwing off his cloak, leaped out, and made a brave defence againſt Clodius's men, who were got about the chariot. But Clodius, in the heat of the ſkirmiſh, giving out that Milo was killed, was himſelf ſlain by the ſervants of Milo, to avenge, as they thought, the death of their maſter. Here ſeems to be all the requiſites proper to make this account credible. Clodius's open and avowed hatred of Milo, which proceeded ſo far as to threaten his life; the time of his leaving Rome; the convenience of the place; his habit and company ſo different from thoſe of Milo, joined with his known character of a moſt profligate and audacious wretch, could not but render it very probable that he had formed that deſign to kill Milo. And which of them began the attack, might very reaſonably be credited from the advanced ground on which Clodius and his men were placed; the death of Milo's coachman at the begining of the combat; the ſkirmiſh afterwards at the chariot; and the reaſon of Clodius's own death at laſt, which does not appear to have been intended, till he had given out that Milo was killed.

But a diſtinct and ſeparate narration is not always neceſſary in any kind of diſcourſe. For if the matter was well known before, a ſet and formal narrative will be tedious to the hearers. Or if one party has done it already, it is needleſs for the other to repeat it. But there are three occaſions eſpecially, in which it may ſeem very requiſite: when it will bring light to the ſubject; when different accounts have already been given out concerning it; or when it has been miſrepreſented by the adverſe party. If the point in controverſy be of a dubious nature, or not ſufficiently known to the hearers, a diſtinct account of the matter, with the particular circumſtances attending it, muſt be very ſerviceable, in order to let them into a true ſtate of the caſe, and enable them to judge of it with greater certainty.

Moreover, where the oppoſite party has ſet the matter in a falſe light by ſome artful and invidious turn, or loaded it with any odious circumſtances, it ſeems no leſs neceſſary that endeavours ſhould be uſed to remove any ill impreſſions, which otherwiſe might remain upon the minds of the hearers, by a different and more favourable repreſentation. And if any thing can be fixed upon to make the contrary account appear abſurd or incredible, it ought particularly to be remarked. Thus Cicero, in his defence of Sextus Roſcius, ſhews that he was many miles diſtant from Rome at the time he was charged to have killed his father there. "Now (ſays he), while Sextus Roſcius was at Ameria, and this Titus Roſcius [*his accuſer*] at Rome, Sextus Roſcius [*the father*] was killed at the baths on Mount Palatine, returning from ſupper. From whence I hope there can be no doubt who ought to be ſuſpected of the murder. And, were not the thing plain of itſelf, there is this further ſuſpicion to fix it upon the proſecutor; that, after the fact was committed, one Manlius Glaucia, an obſcure fellow, the freedman, client, and familiar of this Titus Roſcius, firſt carried the account of it to Ameria, not to the ſon of the deceaſed, but to the houſe of Titus Capito his enemy;" with more to the ſame purpoſe. But what we bring it for is, to ſhew the uſe which

Cicero makes of this narration for retorting the crime upon the proſecutors.

But the orator ſhould be very careful, in conducting this part, to avoid every thing which may prejudice the cauſe he eſpouſes. Falſehood, and a miſrepreſentation of facts, are not to be juſtified; but no one is obliged to ſay thoſe things which may hurt himſelf. We ſhall juſt mention one inſtance of this from Cicero, where he has ſhewn great ſkill in this reſpect, in pleading before Cæſar for the pardon of Ligarius, who had joined with Pompey in the civil war. For Ligarius, having been repreſented by the adverſe party as an enemy to Cæſar, and ſo eſteemed by Cæſar himſelf; Cicero very artfully endeavours in his narration to take off the force of this charge, by ſhewing, that, when the war firſt broke out, he refuſed to engage in it; which he would not have done, had he borne any perſonal hatred to Cæſar. "Quintus Ligarius (ſays he), before there was any ſuſpicion of a war, went into Africa as a legate to the proconſul Caius Conſidius; in which he ſo approved himſelf, both to the Roman citizens and allies, that, when Conſidius left the province, the inhabitants would not be ſatisfied he ſhould leave the government in the hands of any other perſon. Therefore Quintus Ligarius having excuſed himſelf in vain for ſome time, accepted of the government againſt his will; which he ſo managed during the peace, that both the citizens and allies were greatly pleaſed with his integrity and juſtice. The war broke out on a ſudden, which thoſe in Africa did not hear of till it was begun: but upon the news of it, partly through inconſiderate haſte, and partly from blind fear, they looked out for a leader, firſt for their own ſafety, and then as they were affected; when Ligarius, thinking of home, and deſirous to return to his friends, would not be prevailed on to engage in any affairs. In the mean time, Publius Accius Varus, the pretor, who was formerly governor of Africa, coming to Utica, recourſe was immediately had to him, who very eagerly took upon himſelf the government; if that can be called a *government*, which was conferred on a private man by the clamour of the ignorant multitude, without any public authority. Ligarius, therefore, who endeavoured to avoid every thing of that kind, ceaſed to act ſoon after the arrival of Varus." Here Cicero ends his narrative. For, though Ligarius afterwards joined with Pompey's party, yet to have mentioned that, which was nothing more than what many others had done, whom Cæſar had already pardoned, could have ſerved only to increaſe his diſpleaſure againſt him. And therefore he doubtleſs ſhewed great ſkill in ſo managing his account as to take off the main force of the accuſation, and by that means make way for his pardon, which he accordingly obtained.

CHAP. III. *Of the Propoſition.*

28 In every juſt and regular diſcourſe, the ſpeaker's intention is to prove or illuſtrate ſomething. And when he lays down the ſubject upon which he deſigns to treat, in a diſtinct and expreſs manner, this is called the *propoſition*.

Orators uſe ſeveral ways in laying down the ſubject of their diſcourſes. Sometimes they do it in one general propoſition. We have an inſtance of this in Cicero's ſpeech to the ſenate, the day after Cæſar was killed, (as it is given us by Dion Caſſius), in which his deſign was to perſuade them to peace and unanimity. "This (ſays he) being the ſtate of our affairs, I think it neceſſary that we lay aſide all the diſcord and enmity which have been among us, and return again to our former peace and agreement." And then he proceeds to offer his reaſons for this advice.

At other times, to give a clearer and more diſtinct view of their diſcourſe, they ſubjoin to the propoſition the general heads of argument by which they endeavour to ſupport it. This method Cicero uſes in his ſeventh Philippic, where he ſays, "I who have always commended and adviſed to peace, am againſt a peace with Mark Antony. But why am I averſe to peace? Becauſe it is baſe, becauſe it is dangerous, and becauſe it is impracticable. And I beſeech you to hear me with your uſual candor, while I make out theſe three things."

But when the ſubject relates to ſeveral different things, which require each of them to be ſeparately laid down in diſtinct propoſitions, it is called a *partition;* though ſome have made two kinds of *partition*, one of which they call *ſeparation*, and the other *enumeration*. By the former of theſe, the orator ſhews in what he agrees with his adverſary, and wherein he differs from him. So, in the caſe formerly mentioned, of a perſon accuſed of ſacrilege for ſtealing private money out of a temple, he who pleads for the defendant ſays, "He owns the fact; but it being private money, the point in queſtion is, Whether this be ſacrilege?" And in the cauſe of Milo, Cicero, ſpeaking of Clodius, ſays, "The point which now comes before the court, is not, Whether he was killed, or not; that we confeſs; but, Whether juſtly or unjuſtly." Now in reality here is no partition, ſince the former branch of the propoſition is what is agreed upon, and given up; and conſequently it is only the latter that remains to be diſputed. It is called *enumeration*, when the orator acquaints his hearers with the ſeveral parts of his diſcourſe, upon which he deſigns to treat. And this alone, properly ſpeaking, is a *partition*. Thus Cicero ſtates his plea in his defence of Muræna: "I perceive the accuſation conſiſts of three parts: the firſt reſpects the conduct of his life; the ſecond, his dignity; and the third contains a charge of bribery."

There are three things requiſite in a good partition; that it be *ſhort*, *complete*, and conſiſt but of a *few members*.

A partition is ſaid to be *ſhort*, when each propoſition contains in it nothing more than what is neceſſary. So that the brevity here required is different from that of a narration; for that conſiſts chiefly in things, this in words. And, as Quintilian juſtly obſerves, brevity ſeems very proper here, where the orator does not ſhew what he is then ſpeaking of, but what he deſigns to diſcourſe upon.

Again, it ought to be *complete* and perfect. And for this end, care muſt be taken to omit no neceſſary part in the enumeration.

But, however, there ſhould be as *few heads* as is conſiſtent with the nature of the ſubject. The ancient rhetoricians preſcribe three or four at the moſt. And we do not remember that Cicero ever exceeds that number. But it is certain, the fewer they are, the better, provided nothing neceſſary be omitted. For too large a number is both difficult of retention, and apt to introduce that confuſion, which partition is deſigned to prevent.

Hitherto we have been ſpeaking only of thoſe heads into which the ſubject, or general argument of the diſcourſe, is at firſt divided. For it is ſometimes convenient to divide theſe again, or at leaſt ſome of them, into ſeveral parts or members. And when this happens, it is beſt done, as the ſpeaker comes to each of them in the order at firſt laid down; by which means the memory of the hearers will be leſs burdened, than by a multitude of particulars at one and the ſame time. Thus Cicero, in his oration for the Manilian law, compriſes what he deſigns to ſay under three general heads. "Firſt (ſays he) I ſhall ſpeak of the nature of the war, then of its greatneſs, and laſtly about the choice of a general." And when he comes to the firſt of theſe, he divides it again into four branches; and ſhews, "how much the glory of the Romans, the ſafety of their allies, their greateſt revenues, and the fortunes of many of their citizens, were all concerned in that war." The ſecond head, in which he conſiders the greatneſs of the war, has no diviſion. But when he comes to the third head, concerning the choice of a general, he divides that likewiſe into four parts; and ſhews, that ſo many virtues are neceſſary in a conſummate general, ſuch an one as was proper to have the management of that war, namely, *ſkill in military affairs*, *courage*, *authority*, and *ſucceſs*: all which he attributes to Pompey. And this is the ſcheme of that celebrated oration.

Further, ſome divide their ſubject into two parts, and propoſe to treat upon it *negatively* and *poſitively*; by ſhewing firſt what it is not, and then what it is. But while they are employed to prove what it is not, they are not properly treating upon that, but ſomething elſe; which ſeems as irregular, as it is unneceſſary. For he who proves what a thing is, does at the ſame time ſhew what it is not. However, in fact, there is a ſort of diviſion by affirmation and negation, which may ſometimes be conveniently uſed. As if a perſon, charged with killing another, ſhould thus ſtate his defence: *I had done right if I had killed him, but I did not kill him.* Here indeed, if the latter can be plainly made to appear, it may ſeem needleſs to inſiſt upon the former. But if that cannot be ſo fully proved, but there may be room left for ſuſpicion, it may be proper to make uſe of both: for all perſons do not ſee things in the ſame light, and he who believes the fact, may likewiſe think it juſt; while he who thinks it unjuſt, may not believe it, but rather ſuppoſe, had it really been committed by the party, he would not have denied it, ſince he looked upon it as defenſible. And this method of proceeding, Quintilian compares to a cuſtom often uſed in traffic, when perſons make a large demand at firſt, in order to gain a reaſonable price. Cicero uſes this way of reaſoning, in his defence of Milo; but in the contrary order: that is, he firſt anſwers the charge; and then juſtifies the fact, upon the ſuppoſition that the charge was true. For he proves firſt, that Clodius was the aggreſſor; and not Milo, as the contrary party had aſſerted: and then to give the greater advantage to his cauſe, he proceeds to ſhew, that if Milo had been the aggreſſor, it would however have been a glorious action to take off ſuch an abandoned wretch, who was not only a common enemy to mankind, but had likewiſe often threatened his life.

A good and juſt partition is attended with conſiderable advantages. For it gives both light and ornament to a diſcourſe. And it is alſo a great relief to the hearers, who, by means of theſe ſtops and reſts, are much better enabled to keep pace with the ſpeaker without confuſion, and by caſting their thoughts either way, from what has been ſaid, both know and are prepared for what is to follow. And as perſons, in travelling a road with which they are acquainted, go on with greater pleaſure and leſs fatigue, becauſe they know how far it is to their journey's end; ſo to be appriſed of the ſpeaker's deſign, and the ſeveral parts of his diſcourſe which he propoſes to treat on, contributes very much to relieve the hearer, and keep up his attention. This muſt appear very evident to all who conſider how difficult it is to attend long and cloſely to one thing, eſpecially when we do not know how long it may be before we are like to be releaſed. Whereas, when we are before-hand acquainted with the ſcheme, and the ſpeaker proceeds regularly from one thing to another, opportunity is given to eaſe the mind, by relaxing the attention, and recalling it again when neceſſary.

CHAP. IV. *Of Confirmation.*

THE orator having acquainted his hearers, in the 29
propoſition, with the ſubject on which he deſigns to diſcourſe, uſually proceeds either to prove or illuſtrate what he has there laid down. For ſome diſcourſes require nothing more than an enlargement or illuſtration, to ſet them in a proper light, and recommend them to the hearers; for which reaſon, likewiſe, they have often no diſtinct propoſition. But where arguments are brought in defence of the ſubject, this is properly *confirmation*. For, as Cicero defines it, "confirmation is that which gives proof, authority, and ſupport to a cauſe, by reaſoning." And for this end, if any thing in the propoſition ſeems obſcure, or liable to be miſunderſtood, the orator firſt takes care to explain it, and then goes on to offer ſuch arguments for the proof of it, and repreſent them in ſuch a light, as may be moſt proper to gain the aſſent of his hearers.

But here it is proper to obſerve, that there are different ways of reaſoning ſuited to different arts. The mathematician treats his ſubject after another manner than the logician, and the orator in a method different from them both. The forms of reaſoning uſed by orators are four; *Syllogiſm*, *Enthymem*, *Induction*, and *Example*.

I. By *Syllogiſm*. A ſyllogiſm is a form of reaſoning which conſiſts of three propoſitions, the laſt of which is deduced from the two former. The firſt of theſe is called the *major propoſition*, or, for brevity, the *major*; the ſecond, the *minor propoſition*, or *minor*; and the third, the *concluſion*. But as the laſt is oppoſed to the other two jointly, they are called the *premiſes*, and this the *concluſion*. So we may reduce Cicero's argument, by which he endeavours to prove, that Clodius aſſaulted Milo, and not Milo Clodius, to a ſyllogiſm in this manner:

He was the aggreſſor, whoſe advantage it was to kill the other.
But it was the advantage of Clodius to kill Milo, and not Milo's to kill him.
Therefore Clodius was the aggreſſor, or he aſſaulted Milo.

The thing to be proved was, that Clodius aſſaulted Milo, which therefore comes in the concluſion: and the argument, by which it is proved, is taken from the head of profit or advantage. Thus the logician would treat this argument; and if either of the premiſes was queſtioned, he would ſupport it with another ſyllogiſm. But this ſhort and dry way of reaſoning does not at all ſuit the orator: who not only for variety changes the order of the parts, beginning ſometimes with the minor, and at other times with the concluſion, and ending with the major; but likewiſe clothes each part with ſuch ornaments of expreſſion, as are proper to enliven the ſubject, and render it more agreeable and entertaining. And he frequently ſubjoins, either to the major propoſition, or minor, and ſometimes to both, one or more arguments to ſupport them; and perhaps others to confirm or illuſtrate them, as he thinks it requiſite. Therefore, as a logical ſyllogiſm conſiſts of three parts or propoſitions, a rhetorical ſyllogiſm frequently contains four, and many times five parts. And Cicero reckons this laſt the moſt complete. But all that is ſaid in confirmation of either of the premiſes, is accounted but as one part. This will appear more evident by examples. By a ſhort ſyllogiſm Cicero thus proves, that the Carthaginians were not to be truſted: "Thoſe who have often deceived us, by violating their engagements, ought not to be truſted. For if we receive any damage by their treachery, we can blame no body but ourſelves. But the Carthaginians have often ſo deceived us. Therefore it is madneſs to truſt them." Here the major propoſition is ſupported by a reaſon. The minor needed none; becauſe the treachery of the Carthaginians was well known. So that this ſyllogiſm conſiſts of four parts. But by a ſyllogiſm of five parts he proves ſomewhat more largely and elegantly, that the world is under the direction of a wiſe governor. The major is this: "Thoſe things are better governed which are under the direction of wiſdom, than thoſe which are not." This he proves by ſeveral inſtances: "A houſe managed with prudence has every thing in better order, and more convenient, than that which is under no regulation. An army commanded by a wiſe and ſkilful general, is in all reſpects better governed, than one which has a fool or a madman at the head of it. And the like is to be ſaid of a ſhip, which performs her courſe beſt under the direction of a ſkilful pilot." Then he proceeds to the minor thus: "But nothing is better governed than the univerſe." Which he proves in this manner: "The riſing and ſetting of the heavenly bodies keep a certain determined order; and the ſeveral ſeaſons of the year do not only neceſſarily return in the ſame manner, but are ſuited to the advantage of the whole; nor did the viciſſitudes of night and day ever yet become prejudicial, by altering their courſe." From all which he concludes, "That the world muſt be under the direction of a wiſe governor." In both theſe examples, the regular order of the parts is obſerved. We ſhall therefore produce another, in which the order is directly contrary; for beginning with the concluſion, he proceeds next to the minor propoſition, and ſo ends with the major. In his defence of Cœlius, his deſign is to prove that Cœlius had not led a looſe and vicious life, with which his enemies had charged him. And this he does, by ſhewing he had cloſely followed his ſtudies, and was a good orator. This may probably at firſt ſight appear but a weak argument; though to him who conſiders, what Cicero every where declares neceſſary to gain that character, it may perhaps be thought otherwiſe. The ſenſe of what he ſays here may be reduced to this ſyllogiſm.

Thoſe who have purſued the ſtudy of oratory, ſo as to excel in it, cannot have led a looſe and vicious life.
But Cœlius has done this.
Therefore his enemies charge him wrongfully.

But let us hear Cicero himſelf. He begins with the concluſion, thus: "Cœlius is not chargeable with profuſeneſs, extravagancy, contracting of debts, or intemperance, a vice which age is ſo far from abating, that it rather increaſes it. Nay, he never engaged in amours, and thoſe pleaſures of youth, as they are called, which are ſoon thrown off, as reaſon prevails." Then he proceeds to the minor, and ſhews from the effects, that Cœlius had cloſely applied himſelf to the beſt arts, by which he means thoſe neceſſary for an orator: "You have now heard him make his own defence, and you formerly heard him engaged in a proſecution (I ſpeak this to vindicate, not to applaud him), you could not but perceive his manner of ſpeaking, his ability, his good ſenſe, and command of language. Nor did he only diſcover a good genius, which will oftentimes do much of itſelf when it is not improved by induſtry; but what he ſaid (if my affection for him did not bias my judgment) appeared to be the effect of learning, application, and ſtudy." And then he comes to the major: "But be aſſured, that thoſe vices charged upon Cœlius, and the ſtudies upon which I am new diſcourſing, cannot meet in the ſame perſon. For it is not poſſible that a mind, diſturbed by ſuch irregular paſſions, ſhould be able to go through what we orators do, I do not mean only in ſpeaking, but even in thinking." And this he proves by an argument taken from the ſcarcity of good orators. "Can any other reaſon be imagined, why ſo few, both now, and at all times, have engaged in this province, when the rewards of eloquence are ſo magnificent, and it is attended with ſo great delight, applauſe, glory, and honour? All pleaſures muſt be neglected; diverſions, recreations, and entertainments omitted; and even the converſation of all our friends muſt in a manner be laid aſide. This it is which deters perſons from the labour and ſtudy of oratory; not their want of genius, or education."

II. By *Enthymem*. But orators do not often uſe complete ſyllogiſms, but moſt commonly enthymems. An *enthymem* is an imperfect ſyllogiſm, conſiſting of two parts; the concluſion, and one of the premiſes. And in this kind of ſyllogiſm, that propoſition is omitted, whether it be the major or minor, which is ſufficiently manifeſt of itſelf, and may eaſily be ſupplied by the hearers. But the propoſition that is expreſſed, is uſually called the *antecedent*, and the concluſion the *conſequent*. So if the major of that ſyllogiſm be omitted, by which Cicero endeavours to prove that Clodius aſſaulted Milo, it will make this enthymem:

The death of Milo would have been an advantage to Clodius.

Therefore Clodius was the aggreſſor; or, therefore he aſſaulted Milo.

In like manner that other ſyllogiſm above-mentioned, by which he ſhews that the Carthaginians ought not to be truſted, by omitting the minor, may be reduced to the following enthymem:

Thoſe who have often broke their faith, ought not to be truſted.

For which reaſon the Carthaginians ought not to be truſted.

Every one would readily ſupply the minor, ſince the perfidiouſneſs of the Carthaginians was known to a proverb. But it is reckoned a beauty in enthymems, when they conſiſt of contrary parts: becauſe the turn of them is moſt acute and pungent. Such is that of Micipſa in Salluſt: "What ſtranger will be faithful to you, who are an enemy to your friends?" And ſo likewiſe that of Cicero for Milo, ſpeaking of Clodius: "You ſit as avengers of his death; whoſe life you would not reſtore, did you think it in your power." Orators manage enthymems in the ſame manner they do ſyllogiſms; that is, they invert the order of the parts, and confirm the propoſition by one or more reaſons: and therefore a rhetorical enthymem frequently conſiſts of three parts, as a ſyllogiſm does of five. Though ſtrictly ſpeaking, a ſyllogiſm can conſiſt of no more than three parts, and an enthymem but of two: and the arguments brought to ſupport either of the propoſitions conſtitute ſo many new enthymems, of which the part they are deſigned to prove is the concluſion. To illuſtrate this by an example:

An honeſt man thinks himſelf under the higheſt obligation to his country.

Therefore he ſhould ſhun no danger to ſerve it.

In this *enthymem* the major is wanting, which would run thus: "He who is under the higheſt obligations to another, ſhould ſhun no danger in order to ſerve him." This laſt propoſition is founded upon the common principle of gratitude; which requires, that, to the utmoſt of our power, a return ſhould be made in proportion to the kindneſs received. And this being a maxim generally allowed, it is omitted by the orator. But now this enthymem, conſiſting of the minor and concluſion, might be managed in ſome ſuch manner as this, beginning with the concluſion: "An honeſt man ought to ſhun no danger, but readily expoſe his life for the ſafety and preſervation of his country." Then the reaſon of this conduct might be added, which is the antecedent of the enthymem, or minor of the ſyllogiſm: "For he is ſenſible, that his obligations to his country are ſo many, and ſo great, that he can never fully requite them." And this again might be confirmed by an enumeration of particulars: "He looks upon himſelf as indebted to his country for every thing he enjoys; for his friends, relations, all the pleaſures of life, and even for life itſelf." Now the orator calls this *one enthymem*, though in reality there are two: For the ſecond reaſon, or argument, added to the firſt, becomes the antecedent of a new enthymem, of which the firſt reaſon is the conſequent. And if theſe two enthymems were expreſſed ſeparately in the natural order of the parts, the former would ſtand thus: "An honeſt man thinks himſelf under the higheſt obligations to his country: therefore he ought to ſhun no danger for its preſervation." The latter thus: "An honeſt man eſteems himſelf indebted to his country for every thing he enjoys; therefore he thinks he is under the higheſt obligations to it." The ſame thing might be proved in the like way of reaſoning, by arguments of a different kind. From compariſon, thus: "As it would be thought baſe and ungrateful in a ſon not to hazard himſelf for the preſervation of his father; an honeſt man muſt certainly eſteem it ſo when his country is in danger." Or from an example, in this manner: "An honeſt man in like circumſtances would propoſe to himſelf the example of Decius, who freely gave up his life for the ſervice of his country. He gave up his life indeed, but did not loſe it; for he cannot be ſaid to have loſt his life, who lives in immortal honour." And orators frequently intermix ſuch arguments to adorn and illuſtrate their ſubject, with others taken from the nature and circumſtances of things. And now, if we conſider a little this method of reaſoning, we ſhall find it the moſt plain and eaſy imaginable. For when any propoſition is laid down, and one or more reaſons ſubjoined to prove it, each reaſon joined with the propoſition makes a diſtinct enthymem, of which the propoſition is the concluſion. Thus Cicero, in his ſeventh Philippic, lays down this as the foundation of his diſcourſe, "That he is againſt a peace with Mark Antony;" for which he gives three reaſons: "Becauſe it is baſe, becauſe it is dangerous, and becauſe it is impracticable." Theſe ſeverally joined with the propoſition, form three enthymems; and upon each of theſe he diſcourſes ſeparately, which make up that oration. And this method is what perſons for the moſt part naturally fall into, who know nothing of the terms *ſyllogiſm* or *enthymem*. They advance ſomething, and think of a reaſon to prove it, and another perhaps to ſupport that; and, ſo far as their invention will aſſiſt them, or they are maſters of language, they endeavour to ſet what they ſay in the plaineſt light, give it the beſt dreſs, embelliſh it with proper figures and different turns of expreſſion; and, as they think convenient, illuſtrate it with ſimilitudes, compariſons, and the like ornaments, to render it moſt agreeable, till they think what they have advanced ſufficiently proved. As this method of arguing therefore is the moſt plain, eaſy, and natural; ſo it is what is moſt commonly uſed in oratory. Whereas a ſtrict ſyllogiſtical way of diſcourſing is dry and jejune, cramps the mind, and does not admit of thoſe embelliſhments of language which are a great advantage to the orator: for which reaſon he ſeldom uſes complete ſyllogiſms; and when he does, it is with great latitude. —However, ſyllogiſtical reaſoning is very uſeful, though not in popular diſcourſes: for every argument may be reduced to a ſyllogiſm; and if it will not hold in that form, there is certainly ſome flaw in it, which by that means will moſt eaſily be diſcovered.

III. By *induction:* That is, when one thing is inferred 37 ferred from ſeveral others, by reaſon of the ſimilitude between them. And this way of reaſoning is often very uſeful in popular diſcourſes. For many perſons are ſooner moved by examples and ſimilitudes, than by arguments taken from the nature of things. Every one either endeavours to think right, or at leaſt would be eſteemed ſo to do. But it is often no eaſy matter to take in the force of an argument, eſpecially for thoſe who have not been accuſtomed to examine things cloſely, and weigh them duly in their minds. And therefore, when this cannot be done without ſome pain and uneaſineſs to the mind, till it become habitual by practice, it is not to be wondered at if ſuch perſons are beſt pleaſed with that way of reaſoning by which they imagine they can form a judgment of things with the greateſt eaſe and facility. But though inductions are made from all kinds of ſimilitudes, yet thoſe uſually carry the greateſt force with them which are drawn from like facts. Such is that of Cicero in his oration for the Manilian law: for when ſome perſons objected to Pompey's being entruſted with the Mithridatic war, as a thing not cuſtomary to put ſuch an acceſſion of power into the hands of one man; Cicero removes that objection, by producing ſeveral inſtances of the like nature, and particularly ſhews that more new honours had already been conferred on Pompey than upon any other Roman citizen before him, which had all been employed to the advantage of the ſtate. "I will not (ſays he) take notice that two very great wars, the Punic and the Carthaginian, were both managed by one general; and two very powerful cities, which threatened this empire moſt, Carthage and Numantia, both deſtroyed by the ſame Scipio. I will not obſerve, that both you and your fathers thought fit to place the ſafety of the government alone in Caius Marius; and that the ſame perſon ſhould carry on the war with Jugurtha, with the Cimbrians, and with the Teutones. You remember how many new powers have already been conferred on Pompey;" which he then proceeds to enumerate, and from thence infers, that the objection of novelty was no juſt reaſon againſt his being entruſted with the conduct of that important war. And as to other ſimilitudes, it may thus be ſhewn by induction, that virtuous habits are gained and improved by practice. Bodily ſtrength is increaſed and confirmed by daily exerciſe: All manual arts are acquired by repeated trials and experiments: The liberal ſciences are alſo attained by conſtant ſtudy and application: And in like manner the mind is formed to virtue, and improved in it, by the continued practice of right actions.

But there is one particular form of induction called *Socratic*, becauſe Socrates very frequently uſed that way of reaſoning. It proceeds by ſeveral queſtions, which being ſeparately granted, the thing deſigned to be inferred is afterwards put, which, by reaſon of its ſimilitude with the ſeveral caſes allowed before, cannot be denied. But this is a captious way of reaſoning; for while the reſpondent is not aware of what is deſigned to be inferred, he is eaſily induced to make thoſe conceſſions, which otherwiſe he would not. Beſides, it is not ſo well ſuited to continued diſcourſes, as to thoſe which are interlocutory; and therefore we meet with it ofteneſt in the Socratic dialogues both of Plato and Xenophon. However, it may be made uſe of in oratory by a figure called *ſubjection*, when the ſame perſon firſt puts the queſtion, and then makes the anſwer. So in the famous cauſe of Epaminondas, general of the Thebans, who was accuſed for refuſing to ſurrender his command to his ſucceſſor appointed by the ſtate, till after he had engaged the enemy, and given them a total defeat, Cicero thus repreſents his accuſer pleading for the words of the law againſt Epaminondas, who alleged the intention of it in his defence: "Should Epaminondas add that exception to the law, which, he ſays, was the intention of the writer, namely, *Except any one refuſe to give up his command when it is for the intereſt of the public he ſhould not*; would you admit of it? I believe not. Should you yourſelves, which is a thing moſt remote from your juſtice and wiſdom, in order to ſcreen him, order this exception to be added to the law, without the command of the people; would the Thebans ſuffer it to be done? No certainly. Can it be right then to come into that, as if it was written, which it would be a crime to write? I know it cannot be agreeable to your wiſdom to think ſo."

33 IV. By *Example*. Rhetoricians uſe this word in a different ſenſe from the common acceptation. For that is uſually called an *example*, which is brought either to prove or illuſtrate ſome general aſſertion: As if any one ſhould ſay, that *human bodies may be brought to ſuſtain the greateſt labours by uſe and exerciſe*; and in order to prove this ſhould relate what is ſaid of Milo of Croton, that "by the conſtant practice of carrying a calf ſeveral furlongs every day, he could carry it as far after it was to its full ſize." But in oratory the word *example* is uſed for any kind of ſimilitude; or, as Voſſius defines it, "When one thing is inferred from another, by reaſon of the likeneſs which appears between them." Hence it is called an *imperfect induction*, which infers ſomething from ſeveral others of a like nature. But, as was obſerved before, in ſpeaking of induction, ſo likewiſe in examples, thoſe have the greateſt force in reaſoning, which are taken from facts. Now facts may be compared with reſpect to ſome agreement or ſimilitude between them, which in themſelves are either equal or unequal. Of the former kind this is an inſtance: "Cato acted as became a patriot and a lover of his country's liberty, in oppoſing the arms of Cæſar; and therefore ſo did Cicero." The reaſon of the inference is founded in the parity of the caſe, which equally concerned all good ſubjects of the Roman government at that time. For all were alike obliged to oppoſe a common enemy, who endeavoured to ſubvert the conſtitution, and ſubject them to his own arbitrary power. But though an example conſiſts in the compariſon of two ſingle facts, yet ſeveral perſons may be concerned in each fact. Of this kind is that which follows: "As Pompey, Cæſar, and Craſſus, acted illegally in the firſt triumvirate, by engroſſing the ſole power into their own hands, and by that means violating the public liberty; ſo likewiſe did Auguſtus, Mark Anthony, and Lepidus, in the ſecond triumvirate, by purſuing the ſame meaſures." But when Cicero defends Milo for killing Clodius, from the like inſtances of Ahala Servilius, Scipio Naſica, Lucius Opimius, and others; that is not an example, but an induction: becauſe one

thing is there inferred from its ſimilitude to ſeveral others. But when a compariſon is made between two facts that are unequal, the inference may be either from the greater to the leſs, or from the leſs to the greater. From the greater to the leſs in this manner: "Cæſar had no juſt pretenſions to the Roman government, and therefore much leſs had Anthony." The reaſon lies in the difference between the two perſons. Cæſar had very much enlarged the bounds of the Roman empire by his conqueſts, and greatly obliged the populace by his generoſity; but as he had always acted by an authority from the ſenate and people of Rome, theſe things gave him no claim to a power over them. Much leſs then had Anthony any ſuch pretence, who always acted under Cæſar, and had never performed any ſignal ſervices himſelf. Cicero has deſcribed the difference between them in a very beautiful manner in his ſecond Philippic, thus ſpeaking to Anthony: "Are you in any thing to be compared to him? He had a genius, ſagacity, memory, learning, care, thought, diligence; he had performed great things in war, though detrimental to the ſtate; he had for many years deſigned to get the government into his hands, and obtained his end by much labour and many dangers; he gained over the ignorant multitude by public ſhows, buildings, congiaries, and feaſts; obliged his friends by rewards, and his enemies by a ſhew of clemency. In a word, he ſubjected a free ſtate to ſlavery, partly through fear, and partly compliance. I can liken you to him for ambition of power; but in other things you are in no reſpect to be compared with him." By a compariſon from the leſs to the greater, Cicero thus argues againſt Catiline: "Did the brave Scipio, when a private man, kill Tiberius Gracchus, for attempting to weaken the ſtate; and ſhall we conſuls bear with Catiline endeavouring to deſtroy the world by fire and ſword?" The circumſtances of theſe two caſes were very different; and the compariſon runs between a private man, and a conſul intruſted with the higheſt authority; between a deſign only to raiſe a tumult, and a plot to deſtroy the government: whence the orator juſtly infers, that what was eſteemed lawful in one caſe, was much more ſo in the other. The like way of reaſoning is ſometimes uſed from other ſimilitudes, which may be taken from things of all kinds, whether animate or inanimate. Of the former ſort is that of Cicero ſpeaking of Muræna, when candidate for the conſulſhip, after he had himſelf gone through that office: "If it is uſual (ſays he) for ſuch perſons as are ſafely arrived in port, to give thoſe who are going out the beſt account they can with relation to the weather, pirates, and coaſts; becauſe thus nature directs us to aſſiſt thoſe who are entering upon the ſame dangers which we ourſelves have eſcaped: how ought I, who now after a great ſtorm am brought within a near proſpect of land, to be affected towards him, who, I perceive, muſt be expoſed to the greateſt tempeſts of the ſtate?" He alludes to the late diſturbances and tumults occaſioned by the conſpiracy of Catiline, which had been ſo happily ſuppreſſed by him in the time of his conſulate. Of the latter kind is that of Quintilian: "As the ground is made better and more fruitful by culture, ſo is the mind by inſtruction." There is both a beauty and juſtneſs in this ſimile.

But compariſons are ſometimes made between facts and other things, in order to infer ſome difference or oppoſition between them. In comparing two facts, on account of ſome diſagreement and unlikeneſs, the inference is made from the difference between one and the other in that particular reſpect only. As thus: "Though it was not eſteemed cruelty in Brutus to put his two ſons to death, for endeavouring to betray their country; it might be ſo in Manlius, who put his ſon to death, only for engaging the enemy without orders, though he gained the victory." The difference between the two facts, lies in the different nature of the crime. The ſons of Brutus entered into a conſpiracy to betray their country; and though they miſcarried in it, yet the intention and endeavours they uſed to accompliſh it were criminal in the higheſt degree. But young Manlius could only be charged with raſhneſs. His deſign was honourable, and intended for the intereſt of his country; only it was irregular, and might have proved of ill conſequence to military diſcipline. Now in all ſuch caſes, the force of the argument is the ſtronger, the greater the difference appears. But the ſame facts which differ in one reſpect, may agree in many others; as in the example here mentioned. Brutus and Manlius were both magiſtrates as well as fathers; they both killed their ſons, and that for a capital crime by the Roman law. In any of which reſpects they may be compared in a way of ſimilitude: as, "If Brutus might lawfully put his ſon to death for a capital crime, ſo might Manlius." But now contrary facts do not only differ in ſome certain reſpect, but are wholly oppoſite to each other; ſo that what is affirmed of the one, muſt be denied of the other; and if one be a virtue, the other is a vice. Thus Cicero compares the conduct of Marcellus and Verres in a way of oppoſition. "Marcellus (ſays he), who had engaged, if he took Syracuſe, to erect two temples at Rome, would not beautify them with the ſpoils he had taken: Verres, who had made no vows to Honour and Virtue, but to Venus and Cupid, endeavoured to plunder the temple of Minerva. The former would not adorn the gods with the ſpoils of other deities: the latter carried the ornaments of Minerva, a virgin, into the houſe of a ſtrumpet." If therefore the conduct of Marcellus was laudable and virtuous, that of Verres muſt bear the contrary character. But this way of reaſoning has likewiſe place in other reſpects. Thus Cicero, in the quarrel between Cæſar and Pompey, adviſed to peace from the difference between a foreign and domeſtic war: "That the former might prove beneficial to the ſtate; but in the latter, whichever ſide conquered, the public muſt ſuffer." And thus the ill effects of intemperance may be ſhewn in a way of oppoſition: "That as temperance preſerves the health of the body, keeps up the vigour of the mind, and prolongs life; ſo exceſs muſt neceſſarily have the contrary effects."

Thus we have given a brief account of the principal ways of reaſoning commonly made uſe of by orators. As to the diſpoſition of arguments, or the order of placing them, ſome adviſe to put the weaker, which cannot wholly be omitted, in the middle: And ſuch as are ſtronger, partly in the beginning, to gain the eſteem of the hearers and render them more attentive; and partly at the end, becauſe what is laſt heard is likely to be retained longeſt: But if there are but two arguments, to place the ſtronger firſt, and then the weaker; and after that to return again to the former, and inſiſt principally upon that. But this muſt be left to the prudence of the ſpeaker, and the nature of the ſubject. Though to begin with the ſtrongeſt, and ſo gradually deſcend to the weakeſt, can never be proper, for the reaſon laſt mentioned. Nor ought arguments to be crowded too cloſe upon one another; for that takes off from their force, as it breaks in upon the attention of the hearers, and does not leave them ſufficient time duly to conſider them. Nor indeed ſhould more be uſed than are neceſſary; becauſe the fewer they are, the more eaſily they are remembered. And the obſervation of a great maſter of eloquence upon this ſubject is certainly very juſt, that *arguments ought rather to be weighed than numbered.*

CHAP. V. *Of Confutation.*

34 THE forms of reaſoning here are the ſame as have been already explained under *confirmation*. *Confutation*, however, is often the more difficult taſk: becauſe he who is to prove a thing, comes uſually prepared; but he who is to confute it, is frequently left to a ſudden anſwer. For which reaſon, in *judicial* caſes, Quintilian ſays, "It is as much eaſier to accuſe than defend, as it is to make a wound than to heal it." Therefore, not only a good judgment, but a readineſs of thought alſo, ſeems neceſſary for this province. But, in all diſputes, it is of the greateſt conſequence to obſerve where the ſtreſs of the controverſy lies. For without attending to this, perſons may cavil about different matters without underſtanding each other, or deciding any thing. And in confutation, what the adverſary has advanced ought carefully to be conſidered, and in what manner he has expreſſed himſelf. As to the things themſelves; whether they immediately relate to the matter in diſpute, or are foreign to it. Thoſe things that are foreign to the ſubject, may either be paſt over in ſilence, or in a very few words ſhewn to be inſignificant. And there ought likewiſe to be a diſtinction made between ſuch things as relate to the ſubject, according to their importance. Thoſe that appear to have no great weight, ſhould be ſlightly remarked. For to inſiſt largely upon ſuch matters is both tireſome to the hearers, and apt to bring the judgment of the ſpeaker into queſtion. And therefore things of that nature are generally better turned off with an air of neglect, a pungent queſtion, or an agreeable jeſt, than confuted by a ſerious and laboured anſwer. 2. But thoſe things, which relate to the merits of the cauſe, may be confuted either by *contradicting* them, or by ſhewing ſome *miſtake* in the reaſoning, or their *invalidity* when granted.

Things may be *contradicted* ſeveral ways. What is apparently falſe may be expreſsly *denied*. Thus Cicero in his defence of Cluentius: "When the accuſer had ſaid, that the man fell down dead after he had drunk off his cup, denies that he died that day." And things which the adverſary cannot prove, may likewiſe be denied. Of which we have alſo an inſtance in Cicero, who firſt upbraids Mark Anthony as guilty of a breach not only of good breeding, but likewiſe of friendſhip, for reading publicly a private letter he had ſent him. And then adds: "But what will you ſay now, if I ſhould deny that ever I ſent you that letter? How will you prove it? By the hand-writing? In which I confeſs you have a peculiar ſkill, and have found the benefit of it. But how can you make it out? For it is in my ſecretary's hand. I cannot but envy your maſter, who had ſo great a reward for teaching you to underſtand juſt nothing. For what can be more unbecoming not only an orator, but even a man, than for any one to offer ſuch things, which if the adverſary denies, he has nothing more to ſay?" It is an handſome way of contradicting a thing, by ſhewing, that the adverſary himſelf maintained the contrary. So when Oppius was charged with defrauding the ſoldiers of their proviſions, Cicero refutes it, by proving, that the ſame perſons charged Oppius with a deſign to corrupt the army by his liberality. An adverſary is never more effectually ſilenced than when you can faſten contradictions upon him; for this is ſtabbing him with his own weapon. Sometimes a thing is not in expreſs terms denied, but repreſented to be utterly incredible. And this method expoſes the adverſary more than a bare denial. So when ſome perſons reproached Cicero with cowardice, and a ſhameful fear of death; he recites their reaſons in ſuch a manner, that any one would be inclined to think the charge entirely falſe. "Was it becoming me (ſays he) to expect death with that compoſedneſs of mind as ſome have imagined? Well, and did I then avoid it? Nay, was there any thing in the world that I could apprehend more deſirable: Or when I had done the greateſt things in ſuch a crowd of ill-minded perſons about me, do you think baniſhment and death were not always in my view, and continually ſounding in my ears as my certain fate, while I was ſo employed? Was life deſirable, when all my friends were in ſuch ſorrow, and myſelf in ſo great diſtreſs, deprived of all the gifts both of nature and fortune? Was I ſo unexperienced, ſo ignorant, ſo void of reaſon and prudence? Had I never ſeen nor heard any thing in my whole life? Did all I had read and ſtudied avail nothing? What! did not I know that life is ſhort, but the glory of generous actions permanent? When death is appointed for all, does it not ſeem eligible, that life, which muſt be wreſted from us, ſhould rather be freely devoted to the ſervice of our country, than reſerved to be worn out by the decays of nature? Was not I ſenſible, there has been this controverſy among the wiſeſt men, that ſome ſay, the minds of men and their conſciouſneſs utterly periſh at death; and others, that the minds of wiſe and brave men are then in their greateſt ſtrength and vigour, when they are ſet free from the body? The firſt ſtate is not greatly to be dreaded, to be void of ſenſe; but the other, of enjoying larger capacities, is greatly to be deſired. Therefore, ſince I always aimed at dignity, and thought nothing was worth living for without it; how ſhould I, who am paſt the conſulſhip, and did ſo great things in it, be afraid to die?" Thus far Cicero. There is likewiſe an ironical way of contradicting a thing, by retorting that and other things of the like nature upon the adverſe party. Thus Cicero, in his oration againſt Vatinius, ſays: "You have objected to me, that I defended Cornelius, my old friend, and your acquaintance. But pray why ſhould I not have defended him? Has Cornelius carried any law contrary to the omens? Has he violated any law? Has he aſſaulted the conſul? Did he take poſſeſſion of a temple by force of arms? Did he drive away the tribune, who oppoſed the paſſing a law? Has he thrown contempt upon religion? Has he plundered the treaſury? Has he pillaged the ſtate? No, theſe, all theſe, are your doings?" Such an unexpected return is ſometimes of great ſervice to abate the confidence of an adverſary.

A ſecond way of confutation is, by obſerving ſome *flaw* in the reaſoning of the adverſe party. We ſhall endeavour to illuſtrate this from the ſeveral kinds of reaſoning treated of before under *confirmation.* And firſt, as to ſyllogiſms; they may be refuted, either by ſhewing ſome miſtake in the premiſes, or that the concluſion is not juſtly deduced from them. So when the Clodian party contended, that Milo ought to ſuffer death for this reaſon, Becauſe he had confeſſed that he had killed Clodius; that argument, reduced to a ſyllogiſm, would ſtand thus:

He who confeſſes he has killed another, ought not to be allowed to ſee the light.
But Milo confeſſes this.
Therefore he ought not to live.

Now the force of this argument lies in the major or firſt propoſition; which Cicero refutes, by proving, that the Roman people had already determined contrary to what is there aſſerted: "In what city (ſays he) do theſe men diſpute after this weak manner? In that wherein the firſt capital trial was in the caſe of the brave Horatius, who, before the city enjoyed perfect freedom, was ſaved by the ſuffrages of the Roman people, though he confeſſed that he killed his ſiſter with his own hand." But when Cicero accuſed Verres for mal-adminiſtration in his government of Sicily, Hortenſius, who defended him, being ſenſible the allegations brought againſt him could not be denied, had no other way left to bring him off, but by pleading his military virtues in abatement, which at that time were much wanted, and very ſerviceable to the ſtate. The form of the argument was this:

That the Romans then wanted good generals.
That Verres was ſuch.
And conſequently, that it was for the intereſt of the public that he ſhould not be condemned.

But Cicero, who knew his deſign, ſtates the argument for him in his charge; and then anſwers it by denying the conſequence, ſince the crimes of Verres were of ſo heinous a nature, that he ought by no means to be pardoned on the account of any other qualifications: Though indeed he afterwards refutes the minor or ſecond propoſition, and ſhews that he had not merited the character of a good general. Enthymems may be refuted, either by ſhewing that the antecedent is falſe, or the conſequent not juſtly inferred from it. As thus, with reſpect to the former caſe:

A ſtrict adherence to virtue has often proved detrimental.
Therefore virtue ought not conſtantly to be embraced.

Here the antecedent may be denied. For virtue is always beneficial to thoſe who ſtrictly adhere to it, both in the preſent ſatisfaction it affords them, and the future rewards they may certainly expect from it. And as to the latter caſe, in this manner:

She is a mother.
Therefore ſhe loves her children.

Now as the certainty of that inference depends upon this general aſſertion, That all mothers love their children, which is not true, the miſtake of the reaſoning may be ſhewn from the inſtance of Medea and others, who deſtroyed their own children. As to *induction* and *example*, by which the truth or equity of a thing is proved from its likeneſs to one or more other things; the reaſoning in either is invalid, if the things ſo compared can be ſhewn not to have that ſimilitude or agreement on which the inference is founded. One inſtance therefore may ſerve for both. As when Cicero, after the death of Cæſar, pleaded for the continuance of his laws, but not of thoſe which were made afterwards by Mark Anthony: Becauſe, though both were in themſelves invalid, and impoſitions upon the public liberty; yet ſome of Cæſar's were uſeful, and others could not be ſet aſide without diſturbance to the ſtate, and injuring particular perſons; but thoſe of Anthony were all detrimental to the public.

The laſt method of *confutation* before-mentioned was, when the orator does in ſome ſenſe *grant* the adverſary his argument, and at the ſame time ſhews its *invalidity*. And this is done by a variety of ways, according the different nature of the ſubject. Sometimes he allows what was ſaid may be true; but pleads, that what he contends for is neceſſary. This was the method by which Hortenſius propoſed to bring off Verres, as we have already ſhewn from Cicero, whoſe words are theſe, addreſſing himſelf to the judges: "What ſhall I do? which way ſhall I bring in my accuſation? where ſhall I turn myſelf? for the character of a brave general is placed like a wall againſt all the attacks I can make. I know the place, I perceive where Hortenſius intends to diſplay himſelf. He will recount the hazards of war, the neceſſities of the ſtate, the ſcarcity of commanders; and then he will intreat you, and do his utmoſt to perſuade you, not to ſuffer the Roman people to be deprived of ſuch a commander upon the teſtimony of the Sicilians, nor the glory of his arms to be ſullied by a charge of avarice." At other times the orator pleads, that altho' the contrary opinion may ſeem to be attended with advantage, yet that his own is more juſt or honourable. Such was the caſe of Regulus, when his friends endeavoured to prevail with him to continue at Rome, and not return to Carthage, where he knew he muſt undergo a cruel death. But as this could not be done without violating his oath, he refuſed to hearken to their perſuaſions. Another way of confutation is, by retorting upon the adverſary his own argument. Thus Cicero, in his defence of Ligarius, ſays: "You have, Tubero, that which is moſt deſirable to an accuſer, the confeſſion of the accuſed party; but yet ſuch a confeſſion, that he was on the ſame ſide that you, Tubero, choſe yourſelf, and your father too, a man worthy of the higheſt praiſe. Wherefore, if there was any crime in this, you ought firſt to confeſs your own before you attempt to faſten any upon Ligarius." The orator takes this advantage where an argument proves too much, that is, more than the perſon deſigned it for, who made uſe of it. Not much unlike this is what they call *inverſion*, by which the orator ſhews, that the reaſons offered by the oppoſite party make for him. So when Cæcilius urged, that the province of ac-

accuſing Verres ought to be granted to him, and not to Cicero, becauſe he had been his treaſurer in Sicily at the time thoſe crimes were committed with which he was charged, and conſequently knew moſt of that affair; Cicero turns the argument upon him, and ſhews, for that very reaſon he was the moſt unfit of any man to be intruſted with his proſecution; ſince having been concerned with him in his crimes, he would certainly do all in his power to conceal or leſſen them. Again, ſometimes the charge is acknowledged, but the crime ſhifted off to another. Thus, when Sextius was accuſed of ſedition, becauſe he had got together a body of gladiators, and brought them into the forum, where a warm engagement happened between them and Clodius's faction; Cicero owns the fact, but charges the crime of ſedition upon Clodius's party in being the aggreſſors. Another method made uſe of for the ſame purpoſe is, to alleviate the charge, and take off the force of it, by ſhewing, that the thing was not done with that intention which the adverſary inſinuates. Thus Cicero, in his defence of king Dejotarus, owns he had raiſed ſome forces, though not to invade the Roman territories, as had been alleged, but only to defend his own borders, and ſend aid to the Roman generals.

We have hitherto been ſpeaking of the methods of confutation uſed by orators, in anſwering thoſe arguments which are brought by the contrary party. But ſometimes they raiſe ſuch objections themſelves to what they have ſaid, as they imagine may be made by others; which they afterwards anſwer, the better to induce their hearers to think, that nothing conſiderable can be offered againſt what they have advanced, but what will admit of an eaſy reply. Thus, when Cicero, at the requeſt of the Sicilians, had undertaken the accuſation of Verres, it came under debate, whether he, or Cæcilius, who had been Verres's quæſtor in Sicily, ſhould be admitted to that province. Cicero, therefore, in order to ſet him aſide, among other arguments, ſhews his incapacity for ſuch an undertaking, and for that end recounts at large the qualifications neceſſary for an orator. Which he repreſents to be ſo many and great, that he thought it neceſſary to ſtart the following objection to what he had himſelf ſaid upon that ſubject. "But you will ſay perhaps, Have you all theſe qualifications?" To which he thus replies: "I wiſh I had; but it has been my conſtant ſtudy from my youth to gain them. And if, from their greatneſs and difficulty, I have not been able to attain them, who have done nothing elſe through my whole life; how far, do you imagine, you muſt be from it, who never thought of them before; and even now, when you are entering upon them, have no apprehenſion, what, and how great, they are?" This is an effectual way of defeating an adverſary, when the objection is well founded, and clearly anſwered. But we ſhall have occaſion to conſider this matter more largely hereafter, under the figure *prolepſis*, to which it properly relates.

Chap. VI. *Of the Concluſion.*

33 Rhetoricians make ths *concluſion* of a diſcourſe to conſiſt of two parts; *recapitulation*, and *an addreſs to the paſſions*.

1. *Recapitulation* is a ſummary account of what the ſpeaker has before offered in maintenance of his ſubject; and is deſigned both to refreſh the memory of the hearers, and to bring the principal arguments together into a narrow compaſs, that they may appear in a ſtronger light. Now there are ſeveral things neceſſary to a good repetition.

And firſt, it muſt be ſhort and conciſe; ſince it is deſigned to refreſh the memory, and not to burden it. For this end, therefore, the chief things only are to be touched upon; thoſe on which the cauſe principally depends, and which the orator is moſt deſirous ſhould be regarded by his hearers. Now theſe are, The general heads of the diſcourſe, with the main arguments brought to ſupport them. But either to inſiſt particularly upon every minute circumſtance, or to enlarge upon thoſe heads which it may be thought proper to mention, carries in it not ſo much the appearance of a repetition, as of a new diſcourſe.

Again, it is convenient in a repetition to recite things in the ſame order in which they were at firſt laid down. By this means the hearers will be enabled much better to keep pace with the ſpeaker as he goes along; and if they happen to have forgot any thing, they will the more readily readily recal it. And beſides, this method appears moſt ſimple and open, when the ſpeaker reviews what he has ſaid in the ſame manner it was before delivered, and ſets it in the cleareſt light for others to judge of it. But though a repetition contains only the ſame things which had been more largely treated of before; yet it is not neceſſary they ſhould be expreſſed in the ſame words. Nay, this would many times be tireſome and unpleaſant to the hearers; whereas a variety of expreſſion is grateful, provided the ſenſe be the ſame. Beſides, every thing ought now to be repreſented in the ſtrongeſt terms, and in ſo lively manner, as may at the ſame time both entertain the audience, and make the deepeſt impreſſion upon their minds. We have a very exact and accurate example of repetition in Cicero's oration for Quintius. Cicero was then a young man, and ſeems to have kept more cloſely to the rules of art, than afterwards, when by uſe and practice he had gained a greater freedom of ſpeaking. We formerly cited the partition of this ſpeech, upon another occaſion, which runs thus: "We deny, Sextus Nevius, that you was put into the poſſeſſion of the eſtate of P. Quintius, by the prætor's edict. This is the diſpute between us. I will therefore ſhow, firſt, that you had no juſt cauſe to apply to the prætor for poſſeſſion of the eſtate of P. Quintius; then, that you could not poſſeſs it by the edict; and laſtly, that you did not poſſeſs it. When I have proved theſe three things, I will conclude. Now Cicero begins his concluſion with a repetition of thoſe three heads, and a ſummary account of the ſeveral arguments he made uſe of under each of them. But they are too long to be here exhibited. In his oration for the Manilian law, his repetition is very ſhort. He propoſed in the partition to ſpeak to three things: The nature of the war againſt king Mithridates, the greatneſs of it, and what ſort of general was proper to be intruſted with it. And when he has gone thro' each of theſe heads, and treated upon them very largely, he reduces the ſubſtance of what he has ſaid to this general and ſhort account: "Since therefore the war is ſo neceſſary, that it cannot be neglected; and ſo great, that it requires a very careful management; and you can intruſt it with a general of admirable ſkill in military affairs, of ſingular courage, the greateſt authority, and eminent ſucceſs: do you doubt to make uſe of this ſo great a bleſſing, conferred and beſtowed upon you by heaven, for the preſervation and enlargement of the Roman ſtate?" Indeed this repetition is made by Cicero, before he proceeds to the confutation; and not at the end of his diſcourſe, where it is uſually longer and more particular: however, this may ſerve to ſhew the nature of ſuch a recital.

But ſometimes a repetition is made, by running a compariſon between the ſpeaker's own arguments, and thoſe of the adverſe party; and placing them in oppoſition to each other. And this method Cicero takes in the concluſion of his third oration upon the Agrarian law. And here ſometimes the orator takes occaſion to find fault with his adverſary's management, in theſe and ſuch like expreſſions: "This part he has entirely dropt. To that he has given an invidious turn, or a falſe colouring. He leaves arguments, and flies to intreaties; and not without good reaſon, if we conſider the weakneſs of his cauſe."

But when the diſcourſe is very long, and the arguments inſiſted on have been many, to prevent the hearers growing out of patience by a more particular recital, the orator ſometimes only juſt mentions ſuch things, which he thinks of leaſt conſequence, by ſaying, that he omits or paſſes over them, till he comes to what is of greater moment, which he repreſents more fully. This method Cicero has taken in his defence of Cluentius; where, having run over ſeveral leſſer heads in the manner now deſcribed, he then alters his expreſſion, and introduces what was of more importance, by ſaying: "What I firſt complain of, is that wickedneſs, which is now diſcovered." And ſo he proceeds more particularly to recite thoſe things which immediately related to Cluentius. And this is what the writers upon this art call *preterition*. But thus much may ſerve for repetition or recapitulation.

2. We now proceed to the other part of the concluſion, which conſiſts in an *addreſs to the paſſions*. Indeed the orator ſometimes endeavours occaſionally to work upon the paſſions of his hearers in other parts of his diſcourſe, but more eſpecially in the concluſion, where he is warmeſt himſelf, and labours to make them ſo. For the main deſign of the introduction is to conciliate the hearers, and gain their attention; of the narration, propoſition, and confirmation, to inform them; and of the concluſion, to move them. And therefore, to uſe Quintilian's words, "Here all the ſprings of eloquence are to be opened. It is here we ſecure the minds of the hearers, if what went before was well managed. Now we are paſt the rocks and ſhallows, all the ſails may be hoiſted. And as the greateſt part of the concluſion conſiſts in illuſtration, the moſt pompous language and ſtrongeſt figures have place here." Now the paſſions, to which the orator more particularly addreſſes, differ according to the nature of the diſcourſe. In demonſtrative orations, when laudatory,—love, admiration, and emulation, are uſually excited; but in invectives,—hatred, envy, and contempt. In deliberative ſubjects, either the hope of gratifying ſome deſire is ſet in view, or the fear of ſome impending evil. And in judicial diſcourſes, almoſt all the paſſions have place, but more eſpecially reſentment and pity; inſomuch that moſt of the ancient rhetoricians mention only theſe two. But having treated upon the nature of the paſſions, and the methods ſuited both to excite and allay them, in a former chapter, we ſhall at preſent only add a few general obſervations, which may not be improper in this place, where the ſkill of the orator in addreſſing to them is more eſpecially required.

The orator will obſerve what circumſtances either of things, or perſons, or both, will furniſh him with motives proper to apply to thoſe paſſions he deſires to excite in the minds of his hearers. Thus Cicero, in his orations for Plancus and Sylla, moves his hearers from the circumſtances of the men; but in his accuſation of Verres, very frequently from the barbarity and horrid nature of his crimes; and from both, in his defence of Quintius.

But the ſame paſſion may be excited by very different methods. This is plain from the writings of thoſe Roman ſatyriſts which are yet extant; for they have all the ſame deſign, and that is to engage men to a love of virtue, and hatred of vice: but their manner is very different, ſuited to the genius of each writer. Horace endeavours to recommend virtue, by laughing vice out of countenance; Perſius moves us to an abhorrence and deteſtation of vice, with the gravity and ſeverity of a philoſopher; and Juvenal, by open and vehement invectives. So orators make uſe of all theſe methods in exciting the paſſions; as may be ſeen by their diſcourſes, and particularly thoſe of Cicero. But it is not convenient to dwell long upon the ſame paſſion. For the image thus wrought up in the minds of the hearers, does not laſt a great while, but they ſoon return to reflection. When the emotion therefore is once carried as high as it well can be, they ſhould be left under its influence, and the ſpeaker proceed to ſome new matter, before it declines again.

Moreover, orators ſometimes endeavour to raiſe contrary paſſions to each other, as they are concerned for oppoſite parties. So the accuſer excites anger and reſentment, but the defendant pity and compaſſion. At other times, one thinks it ſufficient to allay and take off that paſſion which the other has raiſed, and bring the hearers to a calm and ſedate conſideration of the matter before them.

But this eſpecially is to be regarded, that the orator expreſs the ſame paſſion himſelf with which he endeavours to affect others; and that not only in his action and voice, but likewiſe in his language: and and therefore his words, and manner of expreſſion, ſhould be ſuited to that perturbation and diſorder of mind which he deſigns to repreſent. However, a decency and propriety of character is always carefully to be obſerved; for, as Cicero very well remarks, "A neglect of this is not only very culpable in life, but likewiſe in diſcourſe. Nor do the ſame things equally become every ſpeaker, or every audience; nor every time, and every place." And therefore he greatly commends that painter, who, deſigning to repreſent in a picture the ſacrifice of Iphigenia, Agamemnon's daughter, drew Calchas the prieſt with a ſad countenance; Ulyſſes, her father's great friend, more dejected; and her uncle Menelaus, moſt diſconſolate;

but threw a veil over the face of Agamemnon himſelf, as being unable to expreſs that exceſs of ſorrow which he thought was proper to appear in his countenance. And this juſtneſs of character is admirably well obſerved by Cicero himſelf, in his defence of Milo; for as Milo was always known to be a man of the greateſt reſolution, and moſt undaunted courage, it was very improper to introduce him (as the uſual method then was in capital caſes) moving pity, and begging for mercy. Cicero therefore takes this part upon himſelf; and what he could not do with any propriety in the perſon of Milo, he performs in his own, and thus addreſſes the judges: “ What remains, but that I intreat and beſeech you, that you would ſhew that compaſſion to this brave man, for which he himſelf does not ſolicit, but I, againſt his inclination, earneſtly implore and requeſt. Do not be leſs inclined to acquit him, if in this our common ſorrow you ſee no tear fall from Milo's eyes; but perceive in him the ſame countenance, voice, and language, as at other times, ſteady and unmoved. Nay, I know not whether for this reaſon you ought not much ſooner to favour him: For if, in the conteſts of gladiators, (perſons of the loweſt condition and fortune in life), we are wont to be diſpleaſed with the timorous and ſuppliant, and thoſe who beg for their life; but interpoſe in favour of the brave and courageous, and ſuch as expoſe themſelves to death; and we ſhew more compaſſion to thoſe who do not ſue for it, than to thoſe who do: with how much greater reaſon ought we to act in the ſame manner towards the braveſt of our fellow-citizens?” And as theſe words were agreeable to his own character, while ſoliciting in behalf of another; ſo, immediately after, he introduces Milo ſpeaking like himſelf, with a generous and undaunted air: “ Theſe words of Milo (ſays he) quite ſink and diſpirit me, which I daily hear from him. Farewel, farewel, my fellow-citizens, farewel! may you be happy, flouriſh, and proſper; may this renowned city be preſerved, my moſt dear country, however it has treated me; may it continue in peace, though I cannot continue in it, to whom it owes its peace. I will retire; I will be gone.”

But as perſons are commonly more affected with what they ſee than what they hear, orators ſometimes call in the aſſiſtance of that ſenſe in moving the paſſions. For this reaſon it was uſual among the Romans, in judicial caſes, for accuſed perſons to appear with a dejected air and a ſordid garb, attended by their parents, children, or other relations and friends, with the like dreſs and aſpect; as likewiſe to ſhew their ſcars, wounds, bloody garments, and other things of the like nature, in open court. So when, upon the death of Cæſar, Mark Antony harangued the populace, he at the ſame time expoſed to their view the garment in which he was ſtabbed, fixed upon a pole; at which ſight they were ſo enraged, that immediately they ran with lighted torches to ſet fire to the houſes of the conſpirators. But this cuſtom at laſt became ſo common, and was ſometimes ſo ill conducted, that the force of it was greatly abated, as we learn from Quintilian. However, if the Romans proceeded to an exceſs on the one hand, the ſtrictneſs of the Areopagites at Athens may perhaps be thought too rigid on the other; for in that court, if the orator began to ſay any thing which was moving, an officer immediately ſtood up, and bade him be ſilent. There is certainly a medium between theſe two extremes, which is ſometimes not only uſeful, but even neceſſary: for, as Quintilian very juſtly ſays, “ It is neceſſary to apply to the paſſions, when thoſe things which are true, juſt, and of common benefit, cannot be come at any other way.”

CHAP. VII. *Of Digreſſion, Tranſition, and Amplification.*

THE number, order, and nature of the parts which conſtitute a complete and regular oration, we have endeavoured to explain in ſeveral preceding chapters. But there are two or three things yet remaining, very neceſſary to be known by an orator, which ſeem moſt properly to come under the ſecond branch of his art.—And theſe are, *Digreſſion*, *Tranſition*, and *Amplification*.

37 I. Digreſſion, as defined by Quintilian, is, “ A going off from the ſubject we are upon to ſome different thing, which may however be of ſervice to it.” We have a very beautiful inſtance of this in Cicero's defence of Cœlius, who was accuſed of having firſt borrowed money of Clodia, and then engaging her ſervants to poiſon her. Now, as the proof of the fact depended upon ſeveral circumſtances, the orator examines them ſeparately; and ſhews them to be all highly improbable. “ How,” ſays he, “ was the deſign of this poiſon laid? Whence came it? how did they get it? by whoſe aſſiſtance, to whom, or where, was it delivered?” Now to the firſt of theſe queries he makes the accuſer give this anſwer: “ They ſay Cœlius had it at home, and tried the force of it upon a ſlave provided on purpoſe, whoſe ſudden death proved the ſtrength of the poiſon.” Now as Cicero repreſents the whole charge againſt Cœlius as a fiction of Clodia, invented out of revenge for ſome ſlights he had put upon her; to make this the more probable, he inſinuates that ſhe had poiſoned her huſband, and takes this opportunity to hint it, that he might ſhew how eaſy it was for her to charge another with poiſoning a ſervant, who had done the ſame to her own huſband. But not contented with this, he ſteps out of his way, and introduces ſome of the laſt words of her huſband Metellus, to render the fact more barbarous and ſhocking, from the admirable character of the man. “ O immortal gods! why do you ſometimes wink at the greateſt crimes of mankind, or delay the puniſhment of them to futurity? For I ſaw, I myſelf ſaw (and it was the moſt doleful ſcene of my whole life) when Q. Metellus was taken from the boſom of his country; and when he, who thought himſelf born to be ſerviceable to this ſtate, within three days after he had appeared with ſuch advantage in the ſenate, in the forum, and every where in public, was ſnatched from us in the flower of his age, and prime of his ſtrength and vigour. At which time, when he was about to expire, and his mind had loſt the ſenſe of other things, ſtill retaining a concern for the public, he looked upon me, as I was all in tears, and intimated in broken and dying words, how great a ſtorm hung over the city and threatened the whole ſtate; often ſtriking the wall which ſeparated his houſe from that of Quintus Catulus, and frequently

calling both upon him and me, and ſeeming to grieve not ſo much at the approach of his own death, as that both his country and I ſhould be deprived of his aſſiſtance. Had he not been wickedly taken off on a ſudden, how would he after his conſulſhip have withſtood the fury of his kinſman Publius Clodius, who, while in that office, threatened, in the hearing of the ſenate, to kill him with his own hand, when he firſt began to break out. And will this woman dare to come out of thoſe doors, and talk of the force of poiſon? will not ſhe fear, leſt the houſe itſelf ſhould ſpeak the villany? will not ſhe dread the conſcious walls, nor that ſad and mournful night? But I return to the accuſation." And then he proceeds to conſider and refute the ſeveral circumſtances of the accuſation. All this was no part of his argument; but having mentioned the charge of poiſon, he immediately takes occaſion to introduce it, in order to excite the indignation of the hearers againſt Clodia, and invalidate the proſecution as coming from a perſon of her character. Digreſſion cannot properly be ſaid to be a neceſſary part of a diſcourſe; but it may ſometimes be very convenient, and that upon ſeveral accounts.

As firſt, where a ſubject is of itſelf flat and dry, or requires cloſe attention, it is of uſe to relieve and unbend the mind by ſomething agreeable and entertaining. For which reaſon Quintilian obſerves, that the orators of his time generally made an excurſion in their harangues upon ſome pleaſing topic, between the narration and the proof. But he condemns the practice, as too general; for while they ſeemed to think it neceſſary, it obliged them ſometimes to bring in things trifling and foreign to the purpoſe. Beſides, a digreſſion is confined to no one part of a diſcourſe, but may come in any where, as occaſion offers; provided it fall in naturally with the ſubject, and be made ſome way ſubſervient to it. We never meet with it in Cicero, without ſome evident and good reaſon. So in his proſecution of Verres for his barbarous and inhuman outrages againſt the Sicilians, he takes an occaſion to launch out in a beautiful deſcription of the iſland, and to recount the advantages which accrued from it to the Romans. His ſubject did not neceſſarily lead him to this, but his view in it was to heighten and aggravate the charge againſt Verres.

Again, as a *digreſſion* ought not to be made without ſufficient reaſon, ſo neither ſhould it be too frequent. And he who never does it but where it is proper and uſeful, will not often ſee occaſion for it. Frequently to leave the ſubject, and go off to other things, breaks the thread of the diſcourſe, and is apt to introduce confuſion. Indeed ſome kinds of writing admit of a more frequent uſe of digreſſions than others. In hiſtory they are often very ſerviceable. For as that conſiſts of a ſeries of facts, and a long continued narrative without variety is apt to grow dull and tedious; it is neceſſary at proper diſtances to throw in ſomething entertaining, in order to enliven it, and keep up the attention. And accordingly we find the beſt hiſtorians often embelliſh their writings with deſcriptions of cities, rivers, and countries, as likewiſe with the ſpeeches of eminent perſons upon important occaſions, and other ornaments, to render them the more pleaſing and delightful. Poets take a ſtill greater liberty in this reſpect: for as their principal view is moſt commonly to pleaſe, they do not attend ſo cloſely to connection; but as an image offers itſelf, which may be agreeably wrought up, they bring it in, and go off more frequently to different things, than others writers.

Another property of a *digreſſion* is, that it ought not to be too long, leſt the hearers forget what preceded, before the ſpeaker returns again to his ſubject.

For a digreſſion being no principal part of a diſcourſe, nor of any further uſe than as it ſerves ſome way or other to enforce or illuſtrate the main ſubject; it cannot anſwer this end, if it be carried to ſuch a length, as to cauſe that either to be forgotten, or neglected. And every one's memory will not ſerve him to connect together two parts of a diſcourſe, which lie at a wide diſtance from each other. The better therefore to guard againſt this, it is not unuſual with orators, before they enter upon a digreſſion of any conſiderable length, to prepare their hearers, by giving them notice of it, and ſometimes deſiring leave to divert a little from the ſubject. And ſo likewiſe at the concluſion they introduce the ſubject again by a ſhort tranſition. Thus Cicero in the example cited above, when he has finiſhed his digreſſion concerning the death of Metellus, proceeds to his ſubject again with theſe words: "But I return to the accuſation."

Indeed we find orators ſometimes, when ſore preſſed, and the cauſe will not bear a cloſe ſcrutiny, artfully run into digreſſions with a deſign to divert the attention of the hearers from the ſubject, and turn them to a different view. And in ſuch caſes, as they endeavour to be unobſerved, ſo they do it tacitly without any tranſition or intimation of their deſign; their buſineſs being only to get clear of a difficulty, till they have an opportunity of entering upon ſome freſh topic.

38 II. *Tranſitions* are often uſed not only after a digreſſion, but likewiſe upon other occaſions. A tranſition is, "A form of ſpeech, by which the ſpeaker in a few words tells his hearers both what he has ſaid already, and what he next deſigns to ſay." Where a diſcourſe conſiſts of ſeveral parts, this is often very proper in paſſing from one to another, eſpecially when the parts are of a conſiderable length; for it aſſiſts the hearers to carry on the ſeries of the diſcourſe in their mind, which is a great advantage to the memory. It is likewiſe a great relief to the attention, to be told when an argument is finiſhed, and what is to be expected next. And therefore we meet with it very frequently in hiſtory. But we conſider it at preſent only as made uſe of by orators. Cicero, in his ſecond oration againſt Catiline, who had then left Rome, having at large deſcribed his conduct and deſigns, he adds: "But why do I talk ſo long concerning one enemy, and ſuch an one; who owns himſelf an enemy, and whom I do not fear, ſince, what I always deſired, there is now a wall between us; and ſays nothing of thoſe, who conceal themſelves, who remain at Rome, and among us." And then he proceeds to give an account of the other conſpirators.

But ſometimes, in paſſing from one thing to another, a general hint of it is thought ſufficient to prepare the hearers, without particularly ſpecifying what has been ſaid, or is next to follow. Thus Cicero in his ſecond Philippic ſays: "But thoſe things are old, this is yet freſh." And again: "But I have inſiſted too long upon trifles, let us come to things of greater moment." And at other times, for greater brevity, the tranſition is imperfect, and mention made only of the following head, without any intimation of what has been ſaid already. As in Cicero's defence of Muræna, where he ſays: "I muſt now proceed to the third part of my oration concerning the charge of bribery." And ſoon after: "I come now to Cato, who is the ſupport and ſtrength of this charge."

III. The third and laſt head is, *Amplification.* Now 39 by amplification is meant, not barely a method of enlarging upon a thing, but ſo to repreſent it in the fulleſt and moſt comprehenſive view, as that it may in the liveliest manner ſtrike the mind, and influence the paſſions. Cicero ſpeaking of this, calls it *the greateſt commendation of eloquence;* and obſerves, "that it conſiſts not only in magnifying and heightening a thing, but likewiſe in extenuating and leſſening it." But though it conſiſts of theſe two parts, and may be applied either way; yet to amplify, is not to ſet things in a falſe light, but to paint them in their juſt proportion and proper colours, ſuitable to their nature and qualities. Rhetoricians have obſerved ſeveral ways of doing this.

One is to aſcend from a particular thing to a general. Thus Cicero, in his defence of Archias, having commended him as an excellent poet, and likewiſe obſerved, that all the liberal arts have a connection with each other, and a mutual relation between them, in order to raiſe a juſt eſteem of him in the minds of his hearers, takes occaſion to ſay many things in praiſe of polite literature in general, and the great advantages that may be received from it. "You will aſk me," ſays he, "why we are ſo delighted with this man? Becauſe he ſupplies us with thoſe things, which both 38 refreſh our minds after the noiſe of the forum, and delight our ears when wearied with contention. Do you think we could either be furniſhed with matter for ſuch a variety of ſubjects, if we did not cultivate our minds with learning; or bear ſuch a conſtant fatigue, without affording them that refreſhment? I own I have always purſued theſe ſtudies; let thoſe be aſhamed, who have ſo given up themſelves to learning, as neither to be able to convert it to any common benefit, nor diſcover it in public. But why ſhould it ſhame me, who have ſo lived for many years, that no advantage or eaſe has ever diverted me, no pleaſure allured me, nor ſleep retarded me, from this purſuit. Who then can blame me, or who can juſtly be diſpleaſed with me, if I have employed that time in reviewing theſe ſtudies, which has been ſpent by others in managing their affairs, in the celebration of feſtivals, or other diverſions, in refreſhments of mind and body, in unſeaſonable banquets, in dice, or tennis? And this ought the rather to be allowed me, becauſe my ability as an orator has been improved by thoſe purſuits, which, ſuch as it is, was never wanting to aſſiſt my friends. And if it be eſteemed but ſmall, yet I am ſenſible from what ſpring I muſt draw thoſe things, which are of the greateſt importance." With more to the ſame purpoſe; from which he draws this inference: "Shall I not therefore love this man? ſhall I not admire him? ſhall I not by all means defend him?"

A contrary method to the former is, to deſcend from a general to a particular. As if any one, while ſpeaking in commendation of eloquence, ſhould illuſtrate what he ſays from the example of Cicero, and ſhew the great ſervices he did his country, and the honours he gained to himſelf, by his admirable ſkill in oratory. Our common way of judging of the nature of things is from what we obſerve in particular inſtances, by which we form general notions concerning them. When therefore we conſider the character of Cicero, and the figure he made in the world, it leads us to conclude, there muſt be ſomething very admirable in that art by which he became ſo celebrated. And this method he has taken himſelf in his oration for the Manilian law, where having firſt intimated the ſcarcity of good generals at that time among the Romans, he then deſcribes the virtues of a complete commander as a proof of it, and ſhews how many and great qualifications are neceſſary to form ſuch a character, as courage, prudence, experience, and ſucceſs: all which he afterwards applies to Pompey.

A third method is by an enumeration of parts. So when Cicero, upon the defeat of Mark Antony before Mutina, propoſed that a funeral monument ſhould be erected in honour of the ſoldiers who were killed in that battle, as a comfort to their ſurviving relations; he does it in this way, to give it the greater weight: "Since (ſays he) the tribute of glory is paid to the beſt and moſt valiant citizens by the honour of a monument, let us thus comfort their relations, who will receive the greateſt conſolation in this manner: their parents, who produced ſuch brave defenders of the ſtate; their children, who will enjoy theſe domeſtic examples of fortitude; their wives, for the loſs of ſuch huſbands, whom it will be more fitting to extol than lament; their brethren, who will hope to reſemble them no leſs in their virtues, than their aſpect. And I wiſh we may be able to remove the grief of all theſe by our reſolutions." Such repreſentations greatly enlarge the image of a thing, and afford the mind a much clearer view of it than if it were contracted into one ſingle propoſition.

Again, another method not much unlike the former is, when any thing is illuſtrated from a variety of cauſes. Thus Cicero juſtifies his behaviour in retiring, and not oppoſing his enemies, when they ſpirited up the mob in order to baniſh him, from the following reaſons, which at that time determined him to ſuch a conduct: "When (ſays he) unleſs I was given up, ſo many armed fleets ſeemed ready to attack this ſingle ſhip of the ſtate, toſſed with the tempeſts of ſeditions and diſcords, and the ſenate was now removed from the helm; when baniſhment, murder, and outrage, were threatened; when ſome, from an apprehenſion of their own danger, would not defend me; others were incited by an inveterate hatred to all good men, others thought I ſtood in their way, others took this opportunity to expreſs their reſentment, others envied the peace and tranquillity of the ſtate; and upon all theſe accounts I was particularly ſtruck at: ſhould I have choſen rather to oppoſe them, (I will not ſay to my own certain deſtruction, but to the greateſt danger both of you and your children), than alone to ſubmit to and undergo what threatened us all in common?" Such a number of reaſons brought together, muſt ſet a

Diſpoſition

thing in a very ſtrong and clear light.

The like may be ſaid of a number and variety of effects. Thus Cicero deſcribes the force and excellence of oratory from its great and ſurpriſing effects, when he ſays, "Nothing ſeems to me more excellent, than by diſcourſe to draw the attention of a whole aſſembly, delight them, and ſway their inclinations different ways at pleaſure. This, in every free ſtate, and eſpecially in times of peace and tranquillity, has been always in the higheſt eſteem and reputation. For what is either ſo admirable, as for one only, or a very few, out of a vaſt multitude, to be able to do that which all have a natural power of doing? or ſo delightful to hear, as a judicious and ſolid diſcourſe in florid and polite language? or ſo powerful and grand, as to influence the populace, the judges, the ſenate, by the charms of eloquence? Nay, what is ſo noble, ſo generous, ſo munificent, as to afford aid to ſupplicants, to ſupport the afflicted, give ſafety, deliver from dangers, and preſerve from exile? Or what is ſo neceſſary as to be always furniſhed with arms to guard yourſelf, aſſert your right, or repel injuries? And, not to confine our thoughts wholly to the courts of juſtice or the ſenate, what is there in the arts of peace more agreeable and entertaining than good language and a fine way of ſpeaking? For it is this eſpecially wherein we excel other animals, that we can diſcourſe together, and convey our thoughts to each other by words. Who therefore would not eſteem, and in a particular manner endeavour to ſurpaſs others in that wherein mankind principally excels brute beaſts? But to proceed to its chief advantages: What elſe would have drawn men into ſocieties, or taken them off from a wild and ſavage life, and ſoften them into a polite and civilized behaviour; or, when ſettled in communities, have reſtrained them by laws?" Who but, after ſuch a deſcription, muſt conceive the ſtrongeſt paſſion for an art attended with ſo many great and good effects?

A thing may likewiſe be illuſtrated by its oppoſite. So the bleſſings and advantages of peace may be recommended from the miſeries and calamities of war; and thus Cicero endeavours to throw contempt upon Catiline and his party, by comparing them with the contrary ſide: "But if, omitting all theſe things with which we abound, and they want, the ſenate, the knights, the populace, the city, treaſury, revenues, all Italy, the provinces, and foreign nations; if, I ſay, omitting theſe things, we compare the cauſes themſelves in which each ſide is engaged, we may learn from thence how deſpicable they are.—For on this ſide modeſty is engaged, on that impudence; on this chaſtity, on that lewdneſs; on this integrity, on that fraud; on this piety, on that profaneneſs; on this conſtancy, on that fury; on this honour, on that baſeneſs; on this moderation, on that unbridled paſſion: In a word, equity, temperance, fortitude, prudence, and all virtues, contend with injuſtice, luxury, cowardice, raſhneſs, and all vices; plenty with want; reaſon with folly; ſobriety with madneſs; and, laſtly, good hope with deſpair. In ſuch a conteſt, did men deſert us, would not heaven ordain that ſo many and ſo great vices ſhould be defeated by theſe moſt excellent virtues?"

Diſpoſition

Gradation is another beautiful way of doing this. So when Cicero would aggravate the cruelty and barbarity of Verres for crucifying a Roman citizen, which was a ſort of puniſhment only inflicted upon ſlaves, he chooſes this way of doing it. "It is a crime (ſays he) to bind a Roman citizen, wickedneſs to whip him, and a ſort of parricide to kill him; what then muſt I call it to crucify him? No name can ſufficiently expreſs ſuch a villany." And the images of things may be thus heightened, either by aſcending, as in this inſtance; or deſcending, as in that which follows, relating to the ſame action of Verres: "Was I not to complain of or bewail theſe things to Roman citizens, nor the friends of our ſtate, nor thoſe who had heard of the Roman name; nay, if not to men, but beaſts; or, to go yet further, if in the moſt deſert wilderneſs to ſtones and rocks; even all mute and inanimate creatures would be moved by ſo great and heinous cruelty."

And, to name no more, facts may be amplified from their circumſtances; as time, place, manner, event, and the like. But inſtances of this would carry us too far; and therefore we ſhall only add, that, as the deſign of *amplification* is not barely to prove or evince the truth of things, but alſo to adorn and illuſtrate them, it requires a florid and beautiful ſtyle, conſiſting of ſtrong and emphatical words, flowing periods, harmonious numbers, lively tropes, and bright figures. But the conſideration of theſe things come under the third part of oratory, upon which we are now to enter.

PART III. OF ELOCUTION.

ELOCUTION directs us to ſuit both the words and expreſſions of a diſcourſe to the nature of the ſubject, or to ſpeak with propriety and decency. This faculty is in one word called *eloquence;* and thoſe perſons who are poſſeſſed of it are therefore ſtyled *eloquent*.

Elocution is twofold; general, and particular. The former treats of the ſeveral properties and ornaments of language in common; the latter conſiders them as they are made uſe of to form different ſorts of ſtyle.

I. GENERAL ELOCUTION.

THIS, according to rhetoricians, conſiſts of three parts; *Elegance*, *Compoſition*, and *Dignity*. A diſcourſe which has all theſe properties ſuitably adjuſted, muſt, with reſpect to the language, be perfect in its kind, and delightful to the hearers.

CHAP. I. *Of Elegance.*

ELEGANCE conſiſts in two things; *Purity*, and *Perſpicuity:* And both theſe, as well with reſpect to ſingle words, as their conſtruction in ſentences. Theſe properties in language give it the name of *elegant*, for a like reaſon that we call other things ſo which are clean and neat in their kind. But in the common uſe of our tongue, we are apt to confound *elegance* with *eloquence;* and ſay, *a diſcourſe is elegant*, when we mean by 40 by the expreſſion, that it has all the properties of fine language.

§ 1. *Purity*.

41 By this we are to underſtand the choice of ſuch words and phraſes as are ſuited and agreeable to the uſe of the language in which we ſpeak: And ſo grammarians reduce the faults they oppoſe to it to two ſorts, which they call *barbariſm* and *ſoleciſm*; the former of which reſpects ſingle words, and the latter their conſtruction. But we ſhall conſider them jointly, and in a manner different from grammarians; for with them all words are eſteemed pure, which are once adopted into a language, and authoriſed by uſe. And as to phraſes, or forms of expreſſion, they allow them all the ſame claim, which are agreeable to the analogy of the tongue. But in oratory, neither all words nor all expreſſions are ſo called, which occur in language; but ſuch only as come recommended by the authority of thoſe who ſpeak or write with accuracy and politeneſs. Indeed it is a common ſaying, *that we ſhould think with the learned, and ſpeak with the vulgar*. But the meaning of that expreſſion is no more than that we ſhould ſpeak agreeably to the common uſage of the tongue, that every one may underſtand us; and not chooſe ſuch words or expreſſions as are either difficult to be underſtood, or may carry in them an appearance of affectation and ſingularity. But in order to ſet this matter in a clearer light, we ſhall here recount the principal things which vitiate the purity of language.

And firſt, it often happens, that ſuch words and forms of ſpeaking as were introduced by the learned, are afterwards dropped by them as mean and ſordid, from a ſeeming baſeneſs contracted by vulgar uſe. For polite and elegant ſpeakers diſtinguiſh themſelves by their diſcourſe, as perſons of figure do by their garb; one being the dreſs of the mind, as the other is of the body. And hence it comes to paſs, that both have their different faſhions, which are often changed; and as the vulgar affect to imitate thoſe above them in both, this frequently occaſions an alteration when either becomes too trite and common. But beſide theſe ſordid words and expreſſions, which are rendered ſo by the uſe of the vulgar; there is another ſort firſt introduced by them, which is carefully to be avoided by all thoſe who are deſirous to ſpeak well. For the vulgar have their peculiar words and phraſes, ſuited to their circumſtances, and taken from ſuch things as uſually occur in their way of life. Thus in the old comedians, many things are ſpoken by ſervants, agreeable to their character, which would be very unbecoming from the mouth of a gentleman. And we cannot but daily obſerve the like inſtances among ourſelves.

Again, this is common to language with all other human productions, that it is in its own nature liable to a conſtant change and alteration. For, as Horace has juſtly obſerved,

> All human works ſhall waſte,
> Then how can feeble words pretend to laſt?

Nothing could ever pleaſe all perſons, or at leaſt for any length of time. And there is nothing from which this can leſs be expected than language. For as the thoughts of men are exceedingly various, and words are the ſigns of their thoughts; they will be conſtantly inventing new ſigns to expreſs them by, in order to convey their ideas with more clearneſs, or greater beauty. If we look into the different ages of the Latin writers, what great alterations and changes do we find in their language? How few now underſtand the remaining fragments of the *twelve tables*? Nay, how many words do we meet with even in Plautus, the meaning of which has not yet been fixed with certainty by the ſkill of the beſt critics? And if we conſider our own language, it will appear to have been in a manner entirely changed from what it was a few ages ſince. To mention no others, our celebrated Chaucer is to moſt perſons now almoſt unintelligible, and wants an expoſitor. And even ſince our own memory, we cannot but have obſerved, that many words and expreſſions, which a few years ago were in common uſe, are now in a manner laid aſide and antiquated; and that others have conſtantly ſucceeded, and daily do ſucceed, in their room. So true is that obſervation of the ſame poet:

> Some words that have or elſe will feel decay,
> Shall be reſtor'd, and come again in play;
> And words now fam'd, ſhall not be fancied long,
> They ſhall not pleaſe the ear, nor move the tongue:
> As uſe ſhall theſe approve, and thoſe condemn;
> Uſe, the ſole rule of ſpeech, and judge ſupreme.

We muſt therefore no leſs abſtain from antiquated or obſolete words and phraſes, than from ſordid ones. Though all old words are not to be thought antiquated. By the former we mean ſuch as, though of an ancient ſtanding, are not yet entirely diſuſed, nor their ſignification loſt. And from the uſe of theſe we are not to be wholly debarred, eſpecially when they appear more ſignificant than any others we can fix upon. But as to phraſes or expreſſions, greater caution ſeems ſtill neceſſary; and ſuch as are old, ſhould doubtleſs, if at all, be uſed more ſparingly. The Latin tongue was brought to its greateſt perfection in the reign of Auguſtus, or ſomewhat ſooner; and he himſelf ſtudied it very carefully. For, as Suetonius tells us, "He applied himſelf to eloquence, and the ſtudy of the liberal arts, from his childhood, with great diligence and labour. He choſe a manner of ſpeaking which was ſmooth and elegant: he avoided the ill ſavour, as he uſed to call it, of antiquated words; and he was wont to blame Tiberius for his affectation of them." In our own language, ſuch words are to be eſteemed antiquated, which the moſt polite perſons have dropped, both in their diſcourſe and writings; whoſe example we ſhould follow, unleſs we would be thought to converſe rather with the dead than the living.

But further: As on the one hand we muſt avoid obſolete words and phraſes; ſo on the other, we ſhould refrain from new ones, or ſuch whoſe uſe has not been yet been ſufficiently eſtabliſhed, at leaſt among thoſe of the beſt taſte. Words may be conſidered as new in two reſpects; either when they are firſt brought into a language, or when they are uſed in a new ſenſe. As the former of theſe may ſometimes leave us in the dark by not being underſtood, ſo the latter are moſt apt to miſlead us; for when we hear a word that has been familiar to us, we are preſently led to fix that idea to it with which it has uſually been attended.

And therefore, in both caſes, ſome previous intimation may be neceſſary. Cicero, who perhaps enlarged the furniture of the Roman tongue more than any one perſon beſides, appears always very cautious how he introduces any thing new, and generally gives notice of it when he attempts it, as appears in many inſtances ſcattered through his works. What bounds we are now to fix to the purity of the Latin tongue in the uſe of it, the learned are not well agreed. It is certain, our furniture is much leſs than when it was a living language, and therefore the greater liberty muſt of neceſſity be ſometimes taken. So that their opinion ſeems not unadviſable, who direct us to make choice principally of what we are furniſhed with from the writers of the Auguſtan age; and, where we cannot be ſupplied from them, to make uſe of ſuch authors as lived neareſt to them, either before or ſince. And as to our own tongue, it is certainly prudent to be as careful how we admit any thing into it that is uncouth or diſagreeable to its genius, as the ancient Romans were into theirs; for the perfection of a language does in a great meaſure conſiſt in a certain analogy, and harmony running through the whole, by which it may be capable of being brought to a ſtandard.

But beſides thoſe things already mentioned, any miſtake in the ſenſe of words, or their conſtruction, is oppoſed to purity. For to ſpeak purely, is to ſpeak correctly. And ſuch is the natnre of theſe faults in elocution, that they are often not ſo eaſy to be obſerved by hearing as by reading. Whence it is, that many perſons are thought to ſpeak better than they write; for while they are ſpeaking, many ſlips and inaccuracies eſcape diſregarded, which in reading would preſently appear. And this is more eſpecially the caſe of perſons unacquainted with arts and literature; who, by the aſſiſtance of a lively fancy and flow of words, often ſpeak with great eaſe and freedom, and by that means pleaſe the ear; when, at the ſame time, what they ſay, would not ſo well bear reading.

We ſhall only add, that a diſtinction ought likewiſe to be made between a poetic diction, and that of proſe writers. For poets in all languages have a ſort of peculiar dialect, and take greater liberties, not only in their figures, but alſo in their choice and diſpoſition of words; ſo that what is a beauty in them would often appear unnatural and affected in proſe.

§ 2. *Of Perſpicuity.*

42 PERSPICUITY, as well as *purity*, conſiſts partly in *ſingle words*, and partly in their *conſtruction*.

I. As to *ſingle words*, thoſe are generally cleareſt and beſt underſtood which are uſed in their proper ſenſe. But it requires no ſmall attention and ſkill to be well acquainted with the force and propriety of words; which ought to be duly regarded, ſince the perſpicuity of a diſcourſe depends ſo much upon it. Cæſar ſeems plainly to have been of this mind, when he tells us, "The foundation of eloquence conſiſts in the choice of words." It may not be amiſs, therefore, to lay down ſome few obſervations, by which the diſtinct notions of words and their peculiar force may more eaſily be perceived. All words may be divided into *proper words* and *tropes*. Thoſe are called *proper words*, which are expreſſed in their proper and uſual ſenſe. And *tropes* are ſuch words as are applied to ſome other thing than what they properly denote, by reaſon of ſome ſimilitude, relation, or contrariety between the two things. So, when a ſubtle artful man is called a *fox*, the reaſon of the name is founded in a ſimilitude of qualities. If we ſay, *Cicero will always live*, meaning *his works*, the cauſe is transferred to the effect. And when we are told, *Cæſar conquered the Gauls*, we underſtand that he did it with the aſſiſtance of his army; where a part is put for the whole, from the relation between them. And when Cicero calls Anthony *a fine guardian of the ſtate*, every one perceives he means the contrary. But the nature and uſe of tropes will be explained more fully hereafter in their proper place. All words muſt at firſt have had one original and primary ſignification, which, ſtrictly ſpeaking, may be called their *proper ſenſe*. But it ſometimes happens through length of time, that words loſe their original ſignification, and aſſume a new one, which then becomes their proper ſenſe. So *hoſtis* in the Latin tongue at firſt ſignified a *ſtranger;* but afterwards that ſenſe of the word was entirely laid aſide, and it was uſed to denote a *public enemy*. And in our language, it is well known, that the word *knave* anciently ſignified a *ſervant*. The reaſon of the change ſeems to be much the ſame, as in that of the Latin word *latro;* which firſt ſignified a *ſoldier*, but afterwards a *robber*. Beſides, in all languages it has frequently happened, that many words have gradually varied from their firſt ſenſe to others ſomewhat different; which may, notwithſtanding, all of them, when rightly applied, be looked upon as proper. Nay, in proceſs of time, it is often difficult to ſay which is the original, or moſt proper ſenſe. Again, ſometimes two or more words may appear to have the ſame ſignification with each other, and may therefore be uſed indifferently; unleſs the beauty of the period, or ſome other particular reaſon, determine to the choice of one rather than another. Of this kind are the words *enſis* and *gladius* in the Latin tongue; and in ours, *pity* and *compaſſion*. And there are other words of ſo near an affinity to each other, or at leaſt appear ſo from vulgar uſe, that they are commonly thought to be ſynonymous. Such are the words *mercy* and *pity;* tho' mercy in its ſtrict ſenſe is exerciſed towards an offender, and pity reſpects one in diſtreſs. As this peculiar force and diſtinction of words is carefully to be attended to, ſo it may be known ſeveral ways. Thus the proper ſignification of ſubſtantives may be ſeen by their application to other ſubſtantives. As in the inſtance juſt now given, a perſon is ſaid to ſhew *mercy to a criminal*, and *pity to one in diſtreſs*. And in the like manner verbs are diſtinguiſhed, by being joined to ſome certain nouns, and not to others. 43 So a perſon is ſaid *to command an inferior*, *to intreat a ſuperior*, and *to deſire an equal*. Adjectives alſo, which denote the properties of things, have their ſignification determined by thoſe ſubjects to which they moſt properly relate. Thus we ſay, *an honeſt mind*, and *a healthful body; a wiſe man*, and *a fine houſe*. Another way of diſtinguiſhing the propriety of words, is by their uſe in gradations. As if one ſhould ſay, *Hatreds, grudges, quarrels, tumults, ſeditions, wars, ſpring from unbridled paſſions*. The proper ſenſe of words may likewiſe be known by obſerving to what other words they are either oppoſed, or uſed as equivalent. So in that paſſage of Cicero, where he ſays, " I cannot perceive why you ſhould be angry with me: If it be becauſe I defend him whom you accuſe, why may not I be diſpleaſed with you for accuſing him whom I defend? You ſay, I accuſe my enemy; and I ſay, I defend my friend." Here the words *accuſe* and *defend*, *friend* and *enemy*, are oppoſed; and *to be angry* and *diſpleaſed*, are uſed as terms equivalent. Laſtly, the derivation of words, contributes very much to determine their true meaning. Thus becauſe the word *manners* comes from the word *man*, it may properly be applied either to that, or any other put for it. And therefore we ſay, *the manners of men*, and *the manners of the age*, becauſe the word *age* is there uſed for *the men of the age*. But if we apply the word *manners* to any other animal, it is a trope. By theſe, and ſuch like obſervations, we may perceive the proper ſenſe and peculiar force of words, either by their connection with other words, diſtinction from them, oppoſition to them, equivalency with them, or derivation. And by thus fixing their true and genuine ſignification we ſhall eaſily ſee when they become tropes. But though words, when taken in their proper ſignication, generally convey the plaineſt and cleareſt ſenſe; yet ſome are more forcible, ſonorous, or beautiful than others. And by theſe conſiderations we muſt often be determined in our choice of them. So whether we ſay, *he got*, or *he obtained*, *the victory*, the ſenſe is the ſame; but the latter is more full and ſonorous. In Latin, *timeo* ſignifies *I fear; pertimeo* is more full and ſignificant, and *pertimeſco* more ſonorous than either of the former. The Latin and Greek languages have much the advantage of ours in this reſpect, by reaſon of their compoſitions; by the help of which they can often expreſs that in one word, for which we are obliged to put two words, and ſometimes more. So *pertimeo* cannot be fully expreſſed in our language by one word; but we are forced to join one or two particles to the verb, to convey its juſt idea, and ſay, *I greatly*, or *very much fear:* and yet even then, we ſcarce ſeem to reach its full force. As to tropes, tho' generally ſpeaking they are not to be choſen where plainneſs and perſpicuity of expreſſion is only deſigned, and proper words may be found; yet through the penury of all languages, the uſe of them is often made neceſſary. And ſome of them, eſpecially metaphors, which are taken from the ſimilitude of things, may, when cuſtom has rendered them familiar, be conſidered as proper words, and uſed in their ſtead. Thus, whether we ſay, *I ſee your meaning*, or, *I underſtand your meaning*, the ſenſe is equally clear, tho' the latter expreſſion is proper, and the former metaphorical, by which the action of ſeeing is transferred from the eyes to the mind.

43 II. But *perſpicuity* ariſes not only from a choice of *ſingle words*, but likewiſe from the *conſtruction* of them in ſentences. For the meaning of all the words in a ſentence, conſidered by themſelves, may be very plain and evident; and yet, by reaſon of a diſorderly placing them, or confuſion of the parts, the ſenſe of the whole may be very dark and obſcure. Now it is certain, that the moſt natural order is the plaineſt; that is, when both the words and parts of a ſentence are ſo diſpoſed, as beſt agrees with their mutual relation and dependence upon each other. And where this is changed, as is uſually done, eſpecially in the ancient languages, for the greater beauty and harmony of the periods; yet due regard is had by the beſt writers to the evidence and perſpicuity of the expreſſion.

But to ſet this ſubject in a clearer light, on which the perfection of language ſo much depends, we ſhall mention ſome few things which chiefly occaſion obſcurity; and this either with reſpect to ſingle words, or their conſtruction.

And firſt, all ambiguity of expreſſion is one cauſe of obſcurity. This ſometimes ariſes from the different ſenſes in which a word is capable of being taken. So we are told, that upon Cicero's addreſſing himſelf to Octavius Cæſar, when he thought himſelf in danger from his reſentment, and reminding him of the many ſervices he had done him, Octavius replied, *He came the laſt of his friends*. But there was a deſigned ambiguity in the word *laſt*, as it might either reſpect the time of his coming, or the opinion he had of his friendſhip. And this uſe of ambiguous words we ſometimes meeet with, not only in poetry, where the turn and wit of an epigram often reſts upon it; but likewiſe in proſe, either for pleaſantry or ridicule. Thus Cicero calls Sextus Clodius, *the light of the ſenate;* which is a compliment he pays to ſeveral great men, who had diſtinguiſhed themſelves by their public ſervices to their country. But Sextus, who had a contrary character, was a relation of P. Clodius, whoſe dead body, after he had been killed by Milo, he carried in a tumultuous manner into the ſenate-houſe, and there burnt it with the ſenators benches, in order to inflame the populace againſt Milo. And it is in alluſion to that riotous action, that Cicero, uſing this amguous expreſſion, calls him *the light of the ſenate*. In ſuch inſtances, therefore, it is a beauty, and not the fault we are cautioning againſt; as the ſame thing may be either good or bad, as it is differently applied. Tho' even in ſuch deſigned ambiguities, where one ſenſe is aimed at, it ought to be ſufficiently plain, otherwiſe they loſe their intention. And in all ſerious diſcourſes they ought carefully to be avoided. But obſcurity more frequently ariſes from the ambiguous contruction of words, which renders it difficult to determine in what ſenſe they are to be taken. Quintilian gives us this example of it: " A certain man ordered in his will, that his heir ſhould erect for him a ſtatue holding a ſpear made of gold." A queſtion ariſes here, of great conſequence to the heir from the ambiguity of the expreſſion, whether the words *made of gold*, are to be applied to the *ſtatue* or the *ſpear;* that is, whether it was the deſign of the teſtator by this appointment, that the whole ſtatue, or only the ſpear, ſhould be made of gold. A ſmall note of diſtinction, differently placed between the parts of this ſentence, would clear up the doubt, and determine the ſenſe either way. For if one comma be put after the word *ſtatue*, and another after *ſpear*, the words *made of gold* muſt be referred to the ſtatue, as if it had been ſaid, *a ſtatue, made of gold, holding a ſpear*. But if there be only the firſt comma placed after *ſtatue*, it will limit the words *made of gold* to the *ſpear* only; in the ſame ſenſe as if it had been ſaid, *A ſtatue holding a golden ſpear*. And either of theſe ways of expreſſion would in this caſe have been preferable, for avoiding the ambiguity, according to the intention of the teſtator. The ancient heathen oracles were generally delivered in ſuch ambiguous terms. Which, without doubt, were ſo contrived on purpoſe, that thoſe who gave out the anſwers might have room left for an evaſion.

Again, obſcurity is occaſioned either by too ſhort and conciſe a manner of ſpeaking, or by ſentences too long and prolix; either of theſe extremes have ſometimes this bad conſequence. We find an inſtance of the former in Pliny the elder, where, ſpeaking of hellebore, he ſays, "They forbid it to be given to aged perſons and children, and leſs to women than men." The verb is wanting in the latter part of the ſentence, *and leſs to women than men:* which in ſuch caſes being uſually ſupplied from what went before, would here ſtand thus; *and they forbid it to be given leſs to women than men.* But this is directly contrary to the ſenſe of the writer, whoſe meaning is, either that it is ordered to given in a leſs quantity to women than men, or not ſo frequently to women as men. And therefore the word *order* is here to be ſupplied, which being of a contrary ſignification to *forbid,* expreſſed in the former part of the ſentence, occaſions the obſcurity. That long periods are often attended with the ſame ill effect, muſt be ſo obvious to every one's experience, that it would be entirely needleſs to produce any examples in order to evince the truth of it. And therefore we ſhall only obſerve, that the beſt way of preventing this ſeems to be by dividing ſuch ſentences as exceed a proper length, into two or more; which may generally be done without much trouble.

Another cauſe of obſcurity, not inferior to any yet mentioned, is *parentheſis,* when it is either too long or too frequent. This of Cicero, in his oration for Sylla, is longer than we uſually find in him: "O immortal gods! (for I muſt attribute to you what is your own; nor indeed can I claim ſo much to my own abilities, as to have been able of myſelf to go through ſo many, ſo great, ſuch different affairs, with that expedition, in that boiſterous tempeſt of the ſtate), you inflamed my mind with a deſire to ſave my country." But where any obſcurity ariſes from ſuch ſentences, they may frequently be remedied by much the ſame means as was juſt now hinted concerning long and prolix periods; that is, by ſeparating the parentheſis from the reſt of the ſentence, and placing it either before or after. So in this ſentence of Cicero, the parentheſis may ſtand laſt, in the following manner: "O immortal gods! you inflamed my mind with a deſire to ſave my country: for I muſt attribute to you what is your own; nor indeed can I claim ſo much to my own abilities, as to have been able of myſelf to go through ſo many, ſo great, ſuch different affairs, with that expedition, in that boiſterous tempeſt of the ſtate." This order of the ſentence is very plain, and leſs involved than the former.

CHAP. II. *Of Compoſition.*

44 COMPOSITION, in the ſenſe it is here uſed, gives rules for the ſtructure of ſentences, with the ſeveral members, words, and ſyllables, of which they conſiſt, in ſuch a manner as may beſt contribute to the force, beauty, and evidence of the whole.

Compoſition conſiſts of four parts, which rhetoricians call *period, order, juncture,* and *number.* The firſt of theſe treats on the ſtructure of ſentences; the ſecond, of the parts of ſentences, which are words and members; and the two laſt, of the parts of words, which are letters and ſyllables. For all articulate ſounds, and even the moſt minute parts of language, come under the cognizance of oratory.

§ 1. *Of Period.*

45 IN every ſentence or propoſition, ſomething is ſaid of ſomething. That of which ſomething is ſaid, logicians call the *ſubject;* and that which is ſaid of it, the *predicate:* but in grammatical terms, the former is *a noun ſubſtantive of the nominative caſe,* and the latter *a finite verb.* Theſe two parts may of themſelves conſtitute a ſentence: As when we ſay, *The ſun ſhines,* or *The clock ſtrikes,* the words *ſun* and *clock* are the ſubject in theſe expreſſions, *ſhines* and *ſtrikes* the predicate. But moſt commonly they are accompanied with other words, which in grammatical conſtruction are ſaid either to be connected with or to depend upon them; but in a logical conſideration they denote ſome property or circumſtance relating to them. As in the following ſentence: *A good man loves virtue for itſelf.* The ſubject of this ſentence is *a good man;* and the predicate, or thing affirmed of him, that he *loves virtue for itſelf.* But the two principal or neceſſary words, on which all the reſt depend, are, *man* and *loves.* Now a ſimple ſentence conſiſts of one ſuch noun and verb, with whatever elſe is joined to either or both of them. And a compound ſentence contains two or more of them; and may be divided into ſo many diſtinct propoſitions, as there are ſuch nouns and verbs, either expreſſed or underſtood. So in the following ſentence, *Compliance gains friends, but truth procures hatred,* there are two members, each of which contains in it an entire propoſition. For, *Compliance gains friends,* is one complete ſentence; and, *Truth procures hatred,* is another; which are connected into one compound ſentence by the particle *but.* Moreover, it frequently happens, that compound ſentences are made up of ſuch parts or members, ſome if not all of which are themſelves compounded, and contain in them two or more ſimple members. Such is that of Salluſt: "Ambition has betrayed many perſons into deceit; to ſay one thing, and to mean another; to found friendſhip and enmity, not upon reaſon, but intereſt; and to be more careful to appear honeſt, than really to be ſo." This ſentence conſiſts of four members; the laſt of which three, conſiſting of oppoſite parts, are all compounded, as will appear by expreſſing them at length in the following manner: *Ambition has betrayed many perſons into deceit;* [that is, ambition] *has betrayed them to ſay one thing, it and to mean another; it has betrayed them to found friendſhip and enmity, not upon reaſon, but intereſt; and it has betrayed them to be more careful to appear honeſt, than really to be ſo.* The three laſt of theſe members, beginning with the words *it betrays,* are all of them compounded, and conſiſt of two oppoſite members; which might each of them be expreſſed at length in the ſame manner, by ſupplying the ellipſis. As, *Ambition has betrayed many perſons to ſay one thing, and it has betrayed them to mean another.* And ſo of the reſt. From this inſtance we ſee how much is

left to be ſupplied by the mind in all diſcourſe, which if expreſſed would both deſtroy its harmony and render it exceedingly tedious. But ſtill regard muſt be had to that which is omitted, ſo as to render what is ſaid conſiſtent with it; otherwiſe there can be no propriety in what is ſpoken. Nor can the members of a ſentence be diſtinguiſhed and duly ranged in their proper order, without this. But to proceed: Some ſentences conſiſt either wholly, or in part, of ſuch members as contain in them two or more compound ones, which may therefore, for diſtinction's ſake, be called *decompound members*. Of this kind is that of Cicero in his defence of Milo: "Great is the force of conſcience, great either way: that thoſe perſons are not afraid who have committed no offence; and thoſe who have offended, always think puniſhment preſent before their eyes." The latter member of this ſentence, which begins with the word *that*, contains in it two compound members, which repreſent the different ſtate of mind between innocent and guilty perſons. And it is in the proper diſtinction, and ſeparation of the members in ſuch complex ſentences, that the art of pointing chiefly conſiſts. For the principal uſe of a comma is to divide the ſimple members, a ſemicolon the compound ones, a colon ſuch as are decompounded, and a period the whole from the following ſentence. We mention this the rather, to ſhew the different acceptation of theſe terms by grammarians, from that of the ancient writers upon oratory. For theſe latter apply them to the ſenſe, and not to any points of diſtinction. A very ſhort member, whether ſimple or compound, with them is a comma, and a longer a colon; for they have no ſuch term as a ſemicolon. Beſides, they call a very ſhort ſentence, whether ſimple or compound, a *comma*; and one of ſomewhat a greater length, a *colon*. And therefore, if a perſon expreſſed himſelf either of theſe ways in any conſiderable number of ſentences together, he was to ſpeak by commas or colons. But a ſentence containing more words than will conſiſt with either of theſe terms, they call a ſimple period; the leaſt compound period with them requiring the length of two colons. However, this way of denominating ſentences, and the parts of them, rather from their length than the nature of them, appearing not ſo ſuitable, we have choſen rather to make uſe of the terms *ſimple* and *compound members*; and to call all thoſe *compound periods*, which contain two or more members, whether ſimple or compounded.

But to proceed: Sentences with reſpect to their form or compoſition, are diſtinguiſhed into two ſorts, called by Cicero *tracta*, "ſtraight or direct;" and *contorta*, "bent or winding." By the former are meant thoſe whoſe members follow each other in a direct order, without any inflection; and by the latter, thoſe which ſtrictly ſpeaking are called *periods*. For περιοδος in Greek ſignifies a *circuit* or *circle*. And ſo the Latins call it *circuitus* and *ambitus*. By which both of them mean a ſentence conſiſting of correſpondent parts, ſo framed, that the voice in pronouncing them may have a proper elevation and cadency, and diſtinguiſh them by its inflexion; and as the latter part returns back, and unites with the former, the period, like a circle, ſurrounds and incloſes the whole ſenſe. This elevation of the voice in the former part of the period, is by the Greeks called προτασις, and by the Latins *propoſitio*; and the depreſſion of it in the latter part, by the one αποδοσις, and by the other *redditio*.

Now as ſimple ſentences have not theſe correſpondent parts, which require any inflection of the voice; nor a circular form, by reaſon of their brevity; they are not properly periods, in the ſtrict ſenſe of the word: though in common ſpeech, the words *ſentence* and *period* are often uſed as equivalent terms. Thus, if we ſay, *Generous minds are incited to the performance of noble exploits from motives of glory*; here is no diſtinction of parts, nor inflexion of the voice in this ſentence. And indeed there is not any thing which relates to the ſtructure of theſe ſentences, but what will more properly be taken notice of in the ſecond part of *compoſition*, which is *order*.

And as to thoſe compound ſentences, whoſe members follow each other in a direct order, without any inflection, there is little art required in their compoſition. We ſhall produce one example of this kind from Cicero: "Natural reaſon inclines men to mutual converſe and ſociety; and implants in them a ſtrong affection for thoſe who ſpring from them; and excites them to form communities, and join in public aſſemblies; and, for theſe ends, to endeavour to procure both the neceſſaries and conveniences of life; and that not for themſelves only, but likewiſe their wives, children, and others who are dear to them, and have a right to their aſſiſtance." Here are five ſhort members in this ſentence, placed in a ſeries, without any inflection of the parts, or orbit of the whole. And as ſuch ſentences have no other boundary but the concluſion of the ſenſe, ſuited to the breath of the ſpeaker, he may either contract or lengthen them at pleaſure, without offending the ear. So, ſhould the ſentence laſt mentioned conclude with the firſt member in this manner, *Natural reaſon inclines men to mutual converſe and ſociety*; the ſenſe would be perfect, and the ear ſatisfied. The caſe would be the ſame at the end of the ſecond member, thus: *Natural reaſon inclines men to mutual converſe and ſociety, and implants in them a ſtrong affection for thoſe who ſpring from them.* And the like may be ſaid of the reſt. Since ſuch ſentences therefore may be thus limited at pleaſure, it ſeems more convenient both for the ſpeaker and hearers to confine them to a moderate length.

But becauſe the principal art relating to this part of compoſition lies in the frame and ſtructure of ſuch compound ſentences as are properly called *periods*, we ſhall treat upon theſe ſomewhat more largely. In the formation of theſe periods, two things are chiefly to be regarded; their *length*, and *cadency*. As the length ought to be ſuited to the breath of the ſpeaker, the ancient rhetoricians ſcarce admit of more than four colons; by which we may here underſtand compound members of a moderate ſize, which will be generally found a ſuitable and proportionate length. For to extend them farther than the voice can well manage muſt be painful to the ſpeaker, and of conſequence unpleaſant to the hearers. As to the cadency, what Cicero has obſerved, is found true by experience, that the ears judge what is full and what is deficient; and direct us to fill up our periods, that nothing be wanting, of what they expect. When the voice is raiſed at the beginning of a ſentence, they are in ſuſpence till it be finiſhed; and are pleaſed with a full and juſt cadency, but are ſenſible of any defect, and are diſpleaſed with redundancy. Therefore care muſt be taken that periods be neither deficient, and as it were maimed, that is, that they do not drop before their time, and defraud the ears of what ſeemed to be promiſed them; nor, on the other hand, offend them by too long and immoderate excurſions. This riſe and cadency of the voice in pronunciation, depend on the nature and ſituation of the members, as we ſhall endeavour to ſhew by particular inſtances; in the explication of which, by the word *members*, are to be underſtood ſuch as are compounded. In a period of two members, the turn of the voice begins with the latter member. Of this kind is the following ſentence of Cicero: "If impudence prevailed as much in the forum and courts of juſtice, as inſolence does in the country and places of leſs reſort; Aulus Cæcina would ſubmit as much to the impudence of Sextus Ebutius in this cauſe, as he did before to his inſolence when aſſaulted by him." Here the cadency begins at the words *Aulus Cæcina*. If a ſentence conſiſt of three members, the inflection is beſt made at the end of the ſecond member: for if it begin immediately after the firſt, the voice will either be apt to ſink too low, and not be heard, before it reach the end; or elſe be precipitated, in order to prevent it. Cicero begins his oration for Milo with a ſentence of this form: "Although I fear, it may be a ſhame to be diſmayed at the entrance of my diſcourſe in defence of a moſt valiant man; and that it noways becomes me, while Milo is more concerned for the ſafety of the ſtate than for himſelf, not to ſhew the ſame greatneſs of mind in his behalf: *yet* this new form of proſecution terrifies my eyes, which, whatever way they turn, want the ancient cuſtom of the forum, and former manner of trials." Here the cadency beginning at the third member with the word *yet*, makes a proper diviſion of the ſentence, and eaſy for the ſpeaker. But a period of four members is reckoned the moſt complete and perfect, where the inflection begins at the middle, that is, with the third member. Nor is it the ſame caſe here, as if, in a ſentence of three members, the cadency be made at the ſecond. For in proportion to the time of raiſing the voice, may the ſpace be allowed for its ſinking. The following ſentence of Cicero gives us an inſtance of this, where he ſpeaks to his ſon: "Although, ſon Mark, having now been an hearer of Cratippus for a year, and this at Athens, you ought to abound in the precepts and doctrines of philoſophy, by reaſon of the great character both of your inſtructor and the city; one of which can furniſh you with knowledge, and the other with examples: yet, as I always to my advantage joined the Latin tongue with the Greek, and have done it not only in oratory, but likewiſe in philoſophy; I think you ought to do the ſame, that you may be equally converſant in both languages." The turn in this period begins at the word *yet;* which ſtanding near the middle, the voice is raiſed to that pitch in pronouncing the former part, as to admit of a gradual cadency, without being loſt before the concluſion of the ſentence. But where the ſenſe does not ſuit with this diviſion at the entrance upon the third member, it is beſt made at the fourth. Such is the following ſentence of Cicero: "If I have any genius, which I am ſenſible how ſmall it is; or any readineſs in ſpeaking, wherein I do not deny but I have been much converſant; or any ſkill in oratory, from an acquaintance with the beſt arts, to which I confeſs I have been always inclined: *no one* has a better right to demand of me the fruit of all theſe things, than this Aulus Læcinius." The cadency of this ſentence does not begin till the words *no one;* yet it ends handſomely, and without diſappointing the ear. Though indeed the three firſt members having each of them an inflection, check the elevation of the voice, and by that variety in the pronunciation add to the harmony of the ſentence. An equality of the members ſhould likewiſe be attended to in the compoſition of a period, the better to adjuſt their riſe and cadency. And for this reaſon, in ſentences of three members, where the cadency begins with the third; or in thoſe of four members, where it begins at the fourth; it promotes the harmony to make the laſt member longeſt. This is properly the nature of rhetorical periods, which when rightly formed have both an equal beauty and dignity in their compoſition.

But as all diſcourſe is made up of diſtinct ſentences, and whenever we expreſs our thoughts it is in ſome of the forms above-mentioned; ſo the uſe of them is not promiſcuous, but ſuited to anſwer different deſigns in ſpeaking. And in this view they are conſidered and made uſe of by the orator, as will be ſhewn hereafter.

§ 2. *Of Order.*

By *order*, rhetoricians mean the placing each word [45] and member of a ſentence in ſuch a manner as will moſt contribute to the force, beauty, or evidence of the whole.

Order is of two kinds, *natural* and *artificial*. And each of theſe may be conſidered with reſpect to the parts either of ſimple or compound ſentences.

As to ſimple ſentences, we may call that order *natural*, when all the words in a ſentence are ſo placed, as they are connected with or follow each other in a grammatical conſtruction. And it may properly enough admit of this name, as it is founded in the nature of a propoſition, and the relation of the ſeveral words of which it conſiſts to each other. This we explained in the laſt chapter, and illuſtrated by proper examples; and ſhall therefore only give one inſtance of it here, to introduce the ſubject we are now upon. And it is this: *The fame of Iſocrates excited Ariſtotle to the profeſſion of oratory.* Here theſe words, *the fame of Iſocrates*, contain the ſubject of this ſentence, with what relates to it; and all thoſe which follow, *excited Ariſtotle to the profeſſion of oratory*, make up the predicate and its dependants. And in both parts each word grammatically conſidered ſtands in its proper order of conſtruction. And this ſeems agreeable to the natural way of conveying our thoughts, which leads us firſt to expreſs the ſubject or thing of which ſome other thing is ſaid, before the predicate or that which is ſaid concerning it; and with reſpect to both, as every idea ſucceeds another in the order of our conceptions, to range it in the ſame order when we communicate them to others. Our language in the general keeps pretty much to this method. But in one thing particularly it recedes from it; and that is, in placing adjectives, which denote the properties of things, before their ſubſtantives or ſubjects, whoſe properties they are: As when it is ſaid, *Evil communication corrupts good manners.* And this we always do, except ſomething follows which depends upon the adjective. So we ſay, *He was a man eminent for his virtue;* not, *an eminent man.*

Artificial order, as it reſpects ſimple ſentences, has little or no regard to the natural conſtruction of words; but diſpoſes them in ſuch a manner, as will be moſt agreeable to the ear, and beſt anſwer the deſign of the ſpeaker. The Latins take a much greater liberty in this reſpect than we do, or than the nature of our language will permit. Quintilian ſays, it is beſt for the verb to ſtand laſt, when there is no particular reaſon to the contrary. And he gives this reaſon for it, *becauſe the force of the ſentence lies in the verb.* So that, according to him, they ſeem to have had this view in putting the verb at the end; that as the whole ſentence is imperfect without the verb, the mind being thus held in ſuſpence might receive the deeper impreſſion from it at laſt. They likewiſe ſeparate ſuch words as have an immediate relation between them or dependence one upon another, and place any of them firſt or laſt as they pleaſe. In ſhort, their order ſeems in a manner arbitrary, if it does not break in upon perſpicuity, to which they uſually attend. But moſt of theſe things are unſuitable to the genius of our language. One might ſay indeed, *Convince him you cannot;* inſtead of ſaying, *You cannot convince him:* Or, *With my own eyes I ſaw it;* for, *I ſaw it with my own eyes.* And again: *In proportion to the increaſe of luxury the Roman ſtate declined;* for, *The Roman ſtate declined in proportion to the increaſe of luxury.* But the inverſion of the words in the former order of theſe expreſſions, doth not ſound ſo kindly to an Engliſh ear, which is not accuſtomed to ſuch a manner of ſpeaking.

As to compound ſentences, that is, ſuch as conſiſt of two or more members, either ſimple or compounded; what relates to the words in each member ſeparately, is the ſame as in ſimple ſentences. But with regard to the diſpoſition of the ſeveral members, that may be called the *natural order,* which ſo places them as they mutually depend on each other. Thus the antecedent member naturally precedes the relative; as in this expreſſion, *Men are apt to forgive themſelves, what they blame in others.* In hypothetical ſentences the conditional member naturally ſtands firſt. Thus: *If Socrates be a rational creature, he is a man.* That member which expreſſes the effect of an action naturally comes laſt; as, *Though you offer ever ſo good reaſons, you will not prevail with him.* The like may be ſaid of time, with regard to things done in it; as, *The Roman eloquence ſoon declined, when Cicero was dead.* And to name no more, the reaſon of a thing naturally follows that of which it is the reaſon; as thus: *All the pleaſures of life muſt be uncertain, ſince life itſelf is not ſecure.*

When this order is inverted, it may be ſtyled *artificial.* So to keep to the inſtances already given, the two members in the firſt ſentence may be thus inverted; *What they blame in others, men are apt to forgive themſelves.* In the ſecond, in this manner: *Socrates is a man, if he be a rational creature.* In the third, thus: *You will not prevail with him, though you offer ever ſo good reaſons.* And ſo in the reſt: As, *When Cicero was dead, the Roman eloquence ſoon declined;* and, *Since life itſelf is not ſecure, all the pleaſures of life muſt be uncertain.* The variety of inverſions in a ſentence may generally be greater or leſs in proportion to the number of its members. In the following ſentence of Cicero, the natural order ſeems to be this: *If that greatneſs of mind be void of juſtice, which ſhews itſelf in dangers and labours, it is blameable.* Which may be varied by changing the place of the firſt and third member, in the following manner: *That greatneſs of mind is blameable which ſhews itſelf in dangers and labours, if it want juſtice.* Or by altering the place of all the three members thus: *That greatneſs of mind is blameable, if it be void of juſtice, which ſhews itſelf in dangers and labours.* But oftentimes one member may be included in another, as in the inſtance here given: *If that greatneſs of mind, which ſhews itſelf in dangers and labours, be void of juſtice, it is blameable.* Here the relative member is included in the conditional, which is placed firſt, and the antecedent member follows both. But in Cicero it ſtands thus: *That greatneſs of mind, which ſhews itſelf in dangers and labours, if it want juſtice, is blameable;* where the relative and conditional members are both included in the antecedent member. The Latin tongue commonly admits of a much greater variety in the tranſpoſition of members, as well as in that of ſingle words, than ſuits with our idiom. In the following ſentence the natural order is much preferable, as it beſt ſuits with the proper elevation and cadency of the voice in its pronunciation: *I am willing to remit all that is paſt, provided it may be done with ſafety.* But ſhould we invert the members, and ſay, *Provided it may be done with ſafety, I am willing to remit all that is paſt:* the harmony of the cadency would be loſt. And if the latter member be included in the former, the alteration will ſtill be worſe; as, *I am willing, provided it may be done with ſafety, to forgive all that is paſt.* Here the inflection of the voice falls upon the ſame member as before, and deſtroys the beauty of the period by its elevation afterwards. Some ſentences admit of no involution of their members. Such are thoſe whoſe members are connected by conjunctive or diſjunctive particles. As: *Virtue furniſhes the mind with the trueſt pleaſure in proſperity, and affords it the greateſt comfort in adverſity.* And: *A wiſe man is neither elated by proſperity, nor depreſſed by adverſity.* And the like may be ſaid of thoſe where the latter member begins with ſome illative or redditive particle. As in theſe inſtances: *The chief thing to be regarded in life is virtue, for all other things are vain and uncertain.* And: *Though fortune is always inconſtant, yet ſhe has many votaries.* Neither of the members in any of theſe ways of expreſſion, and ſome others which might be named, can be included one in the other. In all the examples hitherto given, the ſentences conſiſt only of ſimple members; and indeed compound members are not ſo often inverted, nor included one in another, by reaſon of their length. However, we ſhall here produce one inſtance of each: *Whoever conſiders the uncertainty of human* *affairs, and how frequently the greateſt hopes are fruſtrated; he will ſee juſt reaſon to be always on his guard, and not place too much dependence upon things ſo precarious.* This ſentence conſiſts of two compound members, which here ſtand in their natural order, but may be thus inverted: *He will ſee juſt reaſon to be always on his guard, and not place too much dependence on things ſo precarious; whoever conſiders the uncertainty of human affairs, and how often the greateſt hopes are fruſtrated.* In the following ſentence one compound member is included in another: *Let us not conclude, while dangers are at a diſtance, and do not immediately approach us, that we are ſecure; unleſs we uſe all neceſſary precaution to prevent them.* Here the natural order would be: *While dangers are at a diſtance, and do not immediately approach us; let us not conclude, that we are ſecure, unleſs we uſe all neceſſary precaution to prevent them.*

But there are ſome other conſiderations relating to order, which, being taken from the nature of things, equally ſuit all languages. So in amplifying, there ſhould be a conſtant gradation from a leſs to a greater; as when Cicero ſays, *Ambition creates hatred, ſhyneſs, diſcords, ſeditions, and wars.* On the contrary, in extenuating, we ſhould deſcend from a greater to a leſs; as if, ſpeaking of the ancient laws of Rome, one ſhould ſay, *They were ſo far from ſuffering a Roman citizen to be put to death, that they would not allow him to be whipt, or even to be bound.* In conſtituting any whole, we put the parts firſt; as, *Invention, diſpoſition, elocution, and pronunciation, make up the art of oratory.* But in ſeparating any whole, the parts follow; as, *The art of oratory may be divided into theſe four parts; invention, diſpoſition, elocution, and pronunciation.* In every enumeration care muſt be taken not to mix the whole with the parts; but if it be mentioned at all, it muſt either be put firſt or laſt. So it would be wrong to ſay, *He was a man of the greateſt prudence, virtue, juſtice, and modeſty:* for the word *virtue* here contains in it the other three, and therefore ſhould not be inſerted among them.

§ 3. *Of Juncture and Number.*

QUINTILIAN, ſpeaking of compoſition, repreſents a diſcourſe as very happy in that reſpect, when the *order*, *juncture*, and *number*, are all juſt and proper. The firſt of theſe, which gives rules for the due placing of the words and members of a ſentence, has been already explained. We now proceed to the other two, which relate to letters and ſyllables; the former treating of their connection, and the latter of their quantity.

46 I. As to *juncture*. A due attendance is to be given to the nature of the vowels, conſonants, and ſyllables in the connection of words, with regard to the ſound.

As to the *firſt*, when a word ends with a vowel, and the next begins either with a different vowel, or the ſame repeated, it uſually renders the pronunciation hollow and unpleaſant. For, as Quintilian has juſtly obſerved, "This makes a chaſm in the ſentence, and and ſtops the courſe of it." For there muſt be ſome pauſe, in order to pronounce them both, or otherwiſe the ſound of one will be loſt. So, for inſtance, in pronouncing theſe words, *the other day*, unleſs you ſtop a little after the word *the*, the ſound of *e* will not be heard; and if it is dropt, it will occaſion a rougher ſound, from the aſpiration of *th* twice repeated ſo near together, as *th' other day*. Therefore to prevent both theſe inconveniences, we uſually ſay, *t' other day*. But the different conſonants, which together with the vowels make up thoſe ſyllables, often cauſe a conſiderable difference in the pronunciation, ſo as to render it more or leſs agreeable. As, if we ſay, *he overdid it*, the words *he over* have not ſo harſh a ſound, as *the other;* though ſtill they require ſome pauſe to keep them diſtinct. Beſides, ſome vowels meet more amicably, and admit of a ſofter pronunciation, than others. Thoſe which have the weakeſt and ſmalleſt ſound, follow beſt; becauſe they occaſion the leaſt alteration of the organ in forming the two ſounds. Such are *e* and *i;* and therefore, without any chaſm in the ſound, or heſitation of the voice, we ſay, *he is*. But where the action of the organs is greater, and the ſound ſtronger, the pronunciation is more difficult: as when we ſay, *tho' all*. For here is a contrary motion of the lips, which are firſt put forward in ſounding the *o*, and then drawn backward to pronounce the *a;* and therefore the ſound is much ſofter to ſay, *tho' every*, where their action is leſs. And the like ill effect commonly happens from the repetition of the ſame vowel: as if we ſay, *go on;* or, *you uſually act thus*. There is a conſiderable difference between theſe two expreſſions, in repeating the ſound of the vowel, and where either of them is doubled in a ſingle word. For then the ſame ſound only is protracted by one continued motion of the organ; as in the words *good*, and *deem*. But here the ſound is repeated again by a new action of the organ; which, if precipitated, obſcures the ſound of one of the vowels; and, if too much retarded, makes a chaſm in the pronunciation; either of which is unpleaſant to the ear.

But as the coalition of two vowels occaſions an hollow and obſcure ſound, ſo the the meeting of ſome conſonants renders it very harſh and rough. Thus the words *king Xerxes*, and *public good*, when ſo placed, have not only a roughneſs, but likewiſe a difficulty in their pronunciation, from the country action of the lips; which in the former are firſt drawn back and then forward, but in the latter the contrary way, and in both of them with ſome conſiderable force. But this may very eaſily be avoided, by ſaying, with a little alteration in the words, *Xerxes the king*, and *the the good of the public*. So likewiſe the words *ill company*, have a ſofter ſound, than *bad compamy*, for the ſame reaſon. To multiply inſtances of this kind ſeems unneceſſary, which ſo frequently occur in all diſcourſe.

The repetition of the ſame ſyllable, at the end and beginning of words, is the laſt thing to be conſidered. And a little obſervation will convince us, that where this happens, it generally renders the ſound either confuſed, or unpleaſant. Cicero was often rallied on account of this verſe:

O fortunatam natam me conſule Romam.

Every one will eaſily perceive a diſagreeable ſound in the following expreſſion: "A man many times does that unadviſedly, of which he afterwards repents." The chime of the words *man many* both ſeems affected, and diſpleaſes the ear. But this will ſoon be remedied, if we ſeparate thoſe two word, and ſay, "A man does that many times unadviſedly."

From the ſhort account here given of this part of compoſition, it is eaſy to perceive what things are neceſſary to render it moſt complete and accurate; which are theſe following. If a word end with a vowel, the next ought to begin with a conſonant, or ſuch a vowel whoſe ſound may agree well with the former. But if a word conclude with a conſonant, either a vowel ſhould follow, or ſuch a conſonant whoſe pronunciation will ſuit with it. And laſtly, the ſame ſyllable ought not to be repeated at the end of one word, and the beginning of the next. It has been obſerved by ſome critics, that the following verſe at the beginning of Virgil's Æneid, has all theſe properties:

> *Arma virumque cano, Trojae qui primus ab oris.*

Where any word in this verſe ends with a vowel, the next begins with a conſonant; and where any one ends with a conſonant, the next begins with a vowel; and there is no repetition of the ſame ſound throughout the whole. But this is what rarely happens, eſpecially in our language, which abounds with conſonants. And what Quintilian ſays of the coalition of vowels, in treating upon this ſubject, ſeems applicable to the whole. "This" ſays he, "is a thing not much to be dreaded; and I know not whether the neglect of it, or too great a concern about it, be worſe. It neceſſarily checks the vigour of the mind, and diverts it from matters of great importance. And therefore, as it ſhews negligence to permit it, ſo to be in conſtant fear of it diſcovers a low genius." This was the opinion of that judicious writer. And as theſe things cannot always be attended to, it may be ſufficient to avoid them, where they prove very offenſive to the ear, and it may be done without ſome greater inconvenience. So in this ſentence, *Honeſty is the beſt policy*, the coalition of *t* and *p* in the two laſt words *beſt policy* produces a roughneſs in their pronunciation; but as the expreſſion is ſtrong, and cannot perhaps be well altered for the better, the ſound here ought to give way to the ſenſe.

47 II. *Number*. This reſpects the quantity of ſyllables, as *Juncture* does their quality. In the Greek and Roman languages every ſyllable has its diſtinct quantity; and is either long, ſhort, or common: two or more of which joined together in a certain order make a foot, and a determinate number of theſe in a different order conſtitute their ſeveral ſorts of metre. This variety of ſounds gives a much greater harmony to their poetry, than what can ariſe only from the ſeat of the accent, and the ſimilitude of ſound at the end of two verſes, which chiefly regulate our metre. And although their proſe was not ſo confined with regard to the feet, either as to the kind or place of them, as their metrical compoſitions; yet it had a ſort of meaſure, more eſpecially in the riſe and cadency of their periods. This they call *rhetorical number*. And accordingly the ancient writers upon this art acquaint us, what feet are beſt ſuited to the beginning, middle, or concluſion of a ſentence. Such rules are not applicable to our language, which has not that accurate diſtinction of quantity in its ſyllables. For we are apt to confound accent with quantity, and pronounce thoſe ſyllables longeſt, on which we lay the accent, though in their nature they are not ſo. As in the word *ádmirable*, where none but the firſt ſyllable *ad* is pronounced long; though that is only rendered ſo by poſition, and the two following are ſo by nature. And again, in the word *ávarice*, we ſound the firſt *a* long for the ſame reaſon, and the ſecond ſhort; contrary to the nature of both thoſe vowels. However, we ſhall offer a few things that may be of ſome uſe to modulate our periods and adjuſt their cadency.

A great number of monoſyllables do not ſtand well together. For as there ought to be a greater diſtance in the pronounciation between one word and another, than between the ſyllables of the ſame word; ſuch pauſes, though ſhort, yet, when too frequent, make the ſound rough and uneven, and by that means ſpoil its harmony. And this may ſeem more neceſſary to be attended to, becauſe the Engliſh language abounds ſo much with monoſyllables. On the contrary, a continuation of many long words makes a ſentence move too ſlow and heavily. And therefore ſuch periods generally run beſt, which have a proper mixture of words of a different length. Beſides, as every word has its accent, which with us ſtands for quantity; a number either of monoſyllables, or long words, coming together, ſo far abates the harmony, as it leſſens the variety.

Again, ſeveral words of the ſame ending do not ſtand well together, eſpecially where the accent falls upon the ſame ſyllable in each of them. For this creates too great a jingle by the ſimilitude of ſound; and is apt to diſpleaſe, from an appearance of affectation. Of this kind is the following ſentence: *Nothing is more wélcome, delíghtſome, or whóleſome, than reſt to a wearied man.* In ſuch expreſſions therefore, if the order of the words cannot well be altered, ſome other word ſhould be ſubſtituted in the room of one of them at leaſt, to diverſify the ſound. So in the example here given, the ſound might be varied by ſaying: *Nothing is more wélcome, pleáſant, or whóleſome.*

But to add no more, if a ſentence end with a monoſyllable, it is apt to hurt the cadency, and diſappoint the ear; whereas words of a moderate length carry a greater force with them, by the fulneſs of their ſound, and afford the ear what it expected. And there is one ſort of monoſyllables more eſpecially, which never ſtand well at the concluſion of a period, tho' we frequently find them there; and theſe are the ſigns of caſes. Thus we ſay: *Avarice is a crime, which wiſe men are too often guilty óf.* But the cadency would doubtleſs be more agreeable if it was altered thus: *Avarice is a crime, of which wiſe men are too often gúilty.* Every one muſt perceive, when the accent falls upon the laſt ſyllable in the ſentence, as it does if it end with *óf*, the ſound is not ſo pleaſant, as when it reſts upon the preceding ſyllable in the word *gúilty*. Nor are very long words well ſuited either to the beginning or concluſion of a period; for they retard the pronunciation at firſt, and fall too heavy at the end.

CHAP. III. *Of Dignity.*

DIGNITY, conſiſts in the right uſe of tropes and figures. It is not ſufficient for an orator to expreſs himſelf with propriety and clearneſs, or in ſmooth and harmonious periods; but his language muſt likewiſe be 48 be ſuited to the nature and importance of the ſubject. And therefore, as *elegance* gives rules for the firſt of theſe, and *compoſition* for the ſecond; ſo does *dignity* for the laſt of them. It is very evident, that different ſubjects require a different ſtyle and manner of expreſſion; ſince, as Quintilian ſays, "What is magnificent in one diſcourſe, would be turgid in another; and thoſe expreſſions, which appear low upon a ſublime ſubject, would ſuit leſſer matters: and as in a florid harangue a mean word is remarkable, and like a blemiſh; ſo any thing lofty and bright upon a trivial argument is diſproportionate, and like a tumour upon an even ſurface." Now this variety in the manner of expreſſion ariſes in a great meaſure from *tropes* and *figures*, which not only enliven and beautify a diſcourſe, but give it likewiſe force and grandeur; for which reaſon this part of elocution ſeems to have been called *dignity*.

Tropes and figures are diſtinguiſhed from each other in ſeveral reſpects. Tropes moſtly affect ſingle words, but figures whole ſentences. A trope conveys two ideas to the mind by means of one word; but a figure throws the ſentence into a different form from the common and uſual manner of expreſſion. Beſides, tropes are chiefly deſigned to repreſent our thoughts, but figures our paſſions.

§ 1. *Tropes.*

49 A *trope* as it has been uſually defined, is, *the change of a word from its proper ſignification to ſome other with advantage.* The words, *with advantage*, are added in the definition, becauſe a trope ought not to be choſen, unleſs there is ſome good reaſon for uſing it rather than the proper word. But in what manner, or how far, it can be ſaid of all tropes in general, that they change the proper ſignification of words, will beſt appear by conſidering the nature of each kind of them ſeparately. Now in every trope a reference is had to two things, which occaſions two ideas, one of the thing expreſſed, and another of that thing to which it has a reſpect, and is ſupplied by the mind. For all tropes are taken either from things internally related, as the whole and a part; or externally, as cauſe and effect, ſubject and adjunct; or from ſome ſimilitude that is found between them; or from a contrariety. The firſt of theſe is called *ſynecdoche*, the ſecond *metonymy*, the third *metaphor*, and the laſt *irony*. We ſhall endeavour to illuſtrate this by examples. When we ſay, *Hannibal beat the Romans;* the meaning is, that Hannibal and his army did this. So that altho' in ſome ſenſe a part may here be ſaid to ſtand for the whole, which makes it a *ſynecdoche;* yet ſtrictly ſpeaking, the word *Hannibal* does not alter its ſenſe, but there is an ellipſis in the expreſſion, Hannibal being put for himſelf and his army. But if we ſay, *Cicero ſhould be read by all lovers of eloquence;* here indeed the word *Cicero* appears to be changed from its proper ſenſe, and to ſignify the books of Cicero; which is a *metonymy*, the author being put for his works; and therefore ſuch expreſſions need not be deemed elliptical. Again, if any one ſpeaking of a ſubtle and crafty man, ſhould ſay *he is a fox;* the meaning is, he is like a fox; which is a *metaphor*, where the word *fox* retains its proper ſenſe, and denotes that animal, to which the man is compared on account of his craft. Laſtly, if a perſon ſay to another, *Well done;* meaning that the thing was ill done, the word *well* keeps its own ſenſe; but from the manner of its pronunciation, or ſome other circumſtance attending the expreſſion, it will be evident that the contrary is intended: which is called an *irony*. From theſe inſtances it may appear in what latitude we muſt underſtand the common definition of a trope, which makes it to conſiſt in the change of a word from its proper ſenſe into ſome other. But tho' in reality there are but four kinds of tropes, which are diſtinguiſhed by ſo many different reſpects which things bear one to another; yet as theſe ſeveral reſpects are found in a variety of ſubjects, and attended with different circumſtances, the names of *tropes* have from hence been greatly multiplied; which, however, may all be referred to ſome or other of thoſe already mentioned, as will be ſhewn when we come to treat of them in their order. And for diſtinction ſake we ſhall call the former *primary*, and the latter *ſecondary, tropes.*

We now proceed to conſider the reaſons which have occaſioned the introduction of tropes. And theſe, as Quintilian obſerves, are three; *neceſſity, emphaſis*, and *beauty*.

1. Tropes were firſt introduced from *neceſſity*, becauſe no language contains a ſufficient number of proper words to expreſs all the different conceptions of our minds. The mind conſiders the ſame thing various ways; views it in different lights; compares it with other things; and obſerves their ſeveral relations and affections; wherein they agree, and in what they differ. From all which reflections, it is furniſhed with almoſt an infinite number of ideas; which cannot all of them be diſtinguiſhed and expreſſed by proper words, ſince new ones occur daily. And were this poſſible, yet would it be impracticable; becauſe the multitude of words muſt be ſo vaſtly great, that the memory could not retain them, and be able to recall them as occaſion required. Tropes have in a good meaſure redreſſed both theſe inconveniencies; for by means of them the mind is not burdened with a numberleſs ſtock of different words, and yet nothing ſeems to want a name. Thus ſometimes, where a word is wanting to expreſs any particular thing, it is clearly enough repreſented by the name of ſome other thing, by reaſon of the ſimilitude between them. At other times, the cauſe is ſignified by the effect; the ſubject by the adjunct; or the contrary. And the whole is often underſtood by a part, or a part by the whole. And thus by the uſe of tropes, the mind is helped to conceive of ſomething not expreſſed, from that which is expreſſed. It is much the ſame caſe, as when we have occaſion to ſpeak of a perſon, whoſe name we are either unacquainted with, or have forgot; for by deſcribing his perſon, abode, or ſome other circumſtances relating to him, thoſe we converſe with as well underſtand whom we mean, as if we mentioned his name. So the ſhepherd in Virgil, when he could not think of the name of Archimedes, deſcribes him by his works:

> And what's his name who form'd the ſphere,
> And ſhew'd the ſeaſons of the ſliding year?

Beſides, it ſometimes happens in a diſcourſe, that thoſe things are neceſſary to be ſaid, which, if expreſſed in their proper terms, would be offenſive; but being clothed with metaphors, may be conveyed to the mind with decency.

2. A ſecond reaſon above-mentioned for the uſe of

tropes was, *emphaſis*. Tropes do many times expreſs things with greater force and evidence, than can be done by proper words. We receive much the greater part of our knowledge by our ſenſes. And ſimilitudes taken from ſenſible things, as in metaphors, very much aſſiſt the mind in its reflections upon thoſe things which do not come under the cognizance of the ſenſes. For it is certain, that we are ſooner and more ſtrongly affected with ſenſible objects, than with things of which we can have no ideas but from the internal operations of our own minds. Nay, ſometimes one bright and lively trope ſhall convey a fuller and more juſt idea of a thing, than a large periphraſis. So when Virgil calls the Scipios *two thunderbolts of war*, he gives a more lively image of the rapid force and ſpeedy ſucceſs of their arms, than could have been conveyed by a long deſcription in plain words. And in many caſes the tropical uſe of words is ſo emphatical, and ſuited to the idea we deſign to excite; that in this reſpect it may be juſtly eſteemed the moſt proper. So, *incenſed with anger*, *inflamed with deſire*, *fallen into an error*, are all metaphorical expreſſions, uſed in a way of ſimilitude; and yet perhaps no proper words can be made uſe of, which will convey a more lively image of the thing we deſign to repreſent by them.

But *beauty* and ornament, as was obſerved before, have been another cauſe of the uſe of tropes. Some ſubjects require a more florid and elegant dreſs than others. When we deſcribe or applaud, ornaments of ſpeech and a gaiety of expreſſion are requiſite. And it is the buſineſs of an orator to entertain his hearers at the ſame time that he inſtructs them. Now Cicero, who was an admirable judge of the force and power of eloquence, has obſerved, that tropical expreſſions give the mind the greateſt delight and entertainment. "I have often wondered (ſays he) why tropes ſhould give greater pleaſure than proper words. I imagine the reaſon muſt be, either that there is an appearance of wit in neglecting what is at hand, and making choice of ſomething at a diſtance; or that the hearer is furniſhed with a different thought, without being led into a miſtake, which affords a very agreeable pleaſure; or that a whole ſimilitude is conveyed to the mind by a ſingle word; or that, particularly in the beſt and moſt lively metaphor, the image is preſented to our ſight, which is the quickeſt of our ſenſes." And therefore he ſuppoſes, that "as garments were firſt invented from neceſſity, to ſecure us from the injuries of the weather, but improved afterwards for ornament and diſtinction; ſo the poverty of language firſt introduced tropes, which were afterwards increaſed for delight." Beſides, a variety of expreſſion is pleaſing in a diſcourſe. It is many times neceſſary that the ſame things ſhould be repeated; and if this be done in the ſame words, it will grow tireſome to the hearers, and ſink their eſteem of the ſpeaker's ability. Therefore, to prevent this, it is proper the expreſſion ſhould be varied, that although the ſenſe be the ſame, it may give the mind a new pleaſure by its different dreſs.

We come now, in the laſt place, to lay down ſome directions proper to be obſerved in the choice of tropes.

And firſt, as every trope gives us two ideas; one, of the word expreſſed; and another, which, by means of that, the mind connects with it; it is neceſſary, that the relation between theſe two appear very plain and evident. For an obſcure trope is always faulty, unleſs where ſome particular reaſon makes it neceſſary. And therefore tropes ought not to be too far-fetched, leſt that ſhould render them dark. For which reaſon Cicero ſays, he ſhould not chooſe to call any thing deſtructive to a perſon's fortune, *the Syrtis of his patrimony*, but rather the *rock of it*; nor the *Charybdis of his eſtate*, but the *gulph of it*. For thoſe, who either did not know that the Syrtes were two quickſands upon the coaſt of Africa, or that Charybdis was a gulph in the ſtreight of Sicily, both of them very deſtructive to mariners, would be at a loſs to underſtand the meaning of the metaphor. Beſides, metaphors taken from things we have ſeen, affect the mind more forcibly than thoſe which are taken from ſuch things as we have only heard. Now there is ſcarce any one who has not ſeen a rock or a gulph; but there are very few perſons, comparatively, who have been either at Charybdis or the Syrtes. It is neceſſary therefore in a good trope, not only that there be a near affinity between the two ideas, but likewiſe, that this affinity be very obvious and generally known, ſo that the word be no ſooner pronounced, but both images do immediately preſent themſelves to the mind.

Again, as a trope ought to be very plain and evident, ſo likewiſe ſhould it bear a due proportion to the thing it is deſigned to repreſent, ſo as neither to heighten nor diminiſh the juſt idea of it. Indeed, ſometimes, when we ſpeak of things indefinitely, we ſay too much, leſt we ſhould ſeem to ſay too little. And this manner of ſpeaking is called an *hyperbole*; which is not uncommon in the ſacred writings. So, for inſtance, Saul and Jonathan are ſaid to be *ſwifter than eagles, and ſtronger than lions*. But even in this way of expreſſion a proportion is to be obſerved. For ſome very conſiderable and unuſual exceſs of the thing in its kind is at leaſt deſigned by it; which perhaps cannot, or however is not neceſſary to be defined. And therefore Quintilian blames Cato for calling the top of an hill a *wart*; becauſe the proportion between the two ideas is no ways adequate. And ſo, on the contrary, Ariſtotle cenſures Euripides for calling rowing, *the empire of the oar*. Poets indeed are allowed a greater liberty in this reſpect. But an orator ſhould be modeſt in his expreſſions, and take care that he neither ſo heighten nor diminiſh the natural ideas of things by tropes, as to lead his hearers into miſtakes.

But further: As a moderate uſe of tropes, juſtly applied, beautifies and enlivens a diſcourſe; ſo an exceſs of them cauſes obſcurity, by running it into abſtruſe allegories and riddles. Tropes are not the common and ordinary dreſs of our thoughts, but a foreign habit: And therefore he who fills his diſcourſe with a continued ſeries of them, ſeems to act like one who appears in public in a ſtrange dreſs; which no man of character would chooſe to do.

Moreover, as one uſe of tropes is pleaſure and entertainment, we ſhould endeavour to make choice of ſuch as are ſmooth and eaſy. But if at any time we think in neceſſary to uſe a harſh trope, it is proper to ſoften it by ſome precaution. For, as Cicero very handſomely ſays, *a trope ſhould be modeſt, ſince it ſtands in a place which does not belong to it; for which reaſon it ſhould ſeem to come thither by permiſſion, and not by force*. And therefore, when he thought it harſh to ſay, *The death of Cato made the ſenate an orphan;* he guards the expreſſion by ſaying, *The death of Cato has (if I may be allowed to ſay ſo) rendered the ſenate an orphan.*

And, to add no more, care ſhould be taken how we transfer tropes from one language into another. For as they are frequently taken not only from natural things, or ſuch notions as are common to the generality of mankind, but likewiſe from the manners, cuſtoms, and occurrences of particular nations; ſo they may be very plain and obvious to thoſe among whom they took their riſe, but altogether unintelligible to others who are unacquainted with the reaſon of them. It was cuſtomary for the Roman ſoldiers to carry their money in their girdles; hence it was the ſame thing with them to ſay, *a perſon had loſt his girdle*, as that *he had loſt his money*. And becauſe the Romans wore the *toga*, which was a long gown, in time of peace, and a different garb when engaged in war, their writers ſometimes uſe the word *toga* to ſignify peace. But as neither of theſe cuſtoms is in uſe among us, ſo neither would the tropes ſuit our language, or be generally underſtood by us. And even in ſuch tropes as are taken from the common nature of things, languages very much differ. There is a very beautiful trope in the account of St Paul's ſhipwreck, where it is ſaid, *The ſhip was caught, and could not bear up into the wind.* The original word, that we tranſlate *bear up*, is αντοφθαλμειν; and properly ſignifies, *to look, or keep its eyes againſt it;* which is a very ſtrong and lively image, taken from animate beings, and when applied to men often ſignifies *to withſtand* or *reſiſt:* as, αντοφθαλμειν πολεμιω, *to reſiſt an enemy;* and Plutarch ſays of Demoſthenes, that he could not αντοφθαλμειν τω αργυριω, *look againſt* or *reſiſt the power of money*. Nothing is more common with Latin writers, than to call men of a public ſpirit and true patriots, *lumina et ornamenta reipublicæ*, that is, *the lights and ornaments of the ſtate:* And we have borrowed from them the uſe of both theſe metaphors. But becauſe tropes and figures illuſtrate and heighten the ſtyle, they call them alſo, *lumina orationis*, or, *the lights of a diſcourſe*. It ſometimes happens, that only the tropical ſenſe of a word is taken from one language into another, and not the proper ſignification of the ſame word. So *ſcrupulus* in Latin properly ſignifies *a little ſtone, which getting into the ſhoe hurts a perſon as he walks;* hence it it is applied to the mind, and uſed to expreſs *a doubt, or uneaſy thought that gives it pain.* We have borrowed this latter ſenſe of the word, but not the former.

Art. I. PRIMARY TROPES.

50 I. *Metaphor.* A metaphor, as uſually defined, is: *A trope, which changes words from their proper ſignification to another different from it, by reaſon of ſome ſimilitude between them.* But that a word, when uſed metaphorically, does not alter its ſignification, but retains its proper ſenſe, was ſhewn above. However, it may not be amiſs to explain this matter more fully, and ſet it in a clearer light. Every *metaphor*, then, is nothing elſe but a ſhort ſimilitude. Cicero calls it, *a ſimilitude reduced to a ſingle word.* And Quintilian to the ſame purpoſe ſays, that, "a metaphor is a ſhort ſimilitude, and differs from it only in this; that the former is compared to the thing we deſign to expreſs, and the latter is put for it. It is a ſimilitude, when I ſay of a man, he has acted like a lion; and a metaphor, when I ſay, he is a lion." Thus far Quintilian. Now in every ſimilitude three things are requiſite: two things that are compared together; and a third, in which the ſimilitude or likeneſs between them conſiſts. And therefore, to keep to this example, when Horace calls a Roman ſoldier *a lion*, if the word *lion* did not retain its proper ſenſe, there could be no ſimilitude; becauſe there would not be two things to be compared together with reſpect to a third, which is neceſſary in every ſimilitude, and was deſigned by this expreſſion. The ſenſe of which is plainly this: *That as a lion ſeizes his prey with the greateſt fierceneſs, ſo a Roman ſoldier with like rage and fury attacked his enemies.* In the ſame manner, when Cicero calls Piſo *the vulture of the province*, his meaning is, that he was like a vulture, or acted in ſuch a manner as a vulture acts, that is, rapaciouſly. So that the real difference between a metaphor and a ſimilitude conſiſts in this; that a metaphor has not thoſe ſigns of compariſon which are expreſſed in a ſimilitude. But ſome perſons have run into miſtakes in reaſoning from tropes of this kind. For they have ſo argued from metaphorical words, as if all the affections and properties of the things expreſſed by them might be attributed to thoſe other things to which they are applied, and by that means have ſtrained the compariſon (which has uſually but one particular view), in order to make it tally in other reſpects, where there is not that ſimilitude of ideas. We will endeavour to make this evident by another example from Cicero, where he calls M. Anthony *the torch of the ſtate*. The ſimilitude between Anthony and a torch lay in this: *That as a torch burns and deſtroys every thing within its reach, ſo Anthony brought devaſtation and ruin wherever he came.* Now a torch has not only a property to burn, but alſo to give light; but the ſimilitude would not hold in this reſpect, nor was it at all deſigned. For Cicero never calls a wicked profligate man, as Anthony was, *the light of the ſtate;* though he often gives that character to good and virtuous men, who by their examples do as it were enlighten others, and ſhew them the way to be happy themſelves and uſeful to others. But though metaphors are uſually taken from a ſimilitude between two things, as in the inſtances here mentioned; yet ſometimes they are founded in the ſimilitude which two things bear to two others in ſome particular reſpect, by means whereof what properly belongs to one of them is transferred to the other: the former of which are called *ſimple metaphors*, and the latter *analogous*. Hence the rudder of a ſhip may be called its *reins;* for what the reins are to a horſe, that the rudder is to a ſhip in guiding and directing it. So that here is a double ſimilitude, one between a ſhip and an horſe, and another between the rudder of the former and the reins of the latter; and from the analogy between the uſe of the rudder to the one and reins to the other, the reins, which belong properly to the horſe, are applied to the ſhip. Again, ſome metaphors are reciprocal, in which the ſimilitude holds either way. Thus to ſteer and to govern are uſed reciprocally both of a ſhip and a ſtate: the proper expreſſions being, *to ſteer a ſhip*, and *govern a ſtate;* and the contrary metaphori-

cal. But though we ſay, *the foot of a mountain*, borrowing the ſimilitude from animals; yet we do not ſay, on the contrary, *the bottom of an animal*, meaning his feet; and therefore that metaphor is not reciprocal. From this account therefore of the nature of a metaphor, it may be ſaid to be: *The application of a word by way of ſimilitude to ſome other thing than what it properly ſignifies.* And the plainer this ſimilitude appears, the greater beauty there is in the trope.

The uſe of metaphors is very extenſive, as large as univerſal nature. For there are ſcarce any two things which have not ſome ſimilitude between them. However, they may all be reduced to four kinds; which was the ſecond thing propoſed to be conſidered.

The firſt kind of metaphors therefore may be taken from ſimilitudes between animate beings. As where thoſe things, which properly relate to brutes, are accommodated to men; or thoſe which belong to men are applied to brutes. Of the former ſort is that joke of Cicero: *My brother being aſked by Philip, why he barked ſo; anſwered, Becauſe he ſaw a thief.* Here *barking*, the property of a dog, is applied to a man: And the reply does not ſeem to carry more ſeverity, or harſhneſs with it, than the queſtion. By the latter ſort we ſay, *a crafty fox*, and *a generous horſe;* which are affections that properly relate to men. And to this kind of metaphors may thoſe likewiſe be referred, when that which properly belongs to the ſenſes is applied to the mind. Thus we often ſay *that we ſee a thing*, when we mean *that we underſtand* or *apprehend it*. And in the ſame ſenſe we ſay, *that we hear ſuch a thing*, or *perſon*. And by the like manner of expreſſion, a perſon is ſaid *to ſmell out a thing*. And thoſe who have a genius or diſpoſition for any art or ſcience, are ſaid *to have a taſte for it;* and ſuch as have entered upon the ſtudy of it, are ſaid *to have a touch of it*. Theſe are common ways of ſpeaking in moſt languages, and very expreſſive of what is intended by them. And we may alſo bring thoſe metaphors under this head, by which the properties and affections of men are attributed to the Deity: as, when God is ſaid *to hear*, *ſee*, *be angry*, *repent*, and the like; which are forms of expreſſions very frequent in the ſacred writings.

A ſecond kind of metaphors lies between inanimate things, whether natural or artificial, which bear ſome ſimilitude to each other. And this head is very extenſive. Thus we ſay, *floods of fire*, and *clouds of ſmoke*, for large quantities. And ſo likewiſe, *to inflame an account*, that is, to heighten or increaſe it; with innumerable others of the like ſort. In the two firſt of theſe inſtances, the terms proper to one element are applied to another; and as thoſe elements of fire and water are oppoſite to each other, they ſhew the extenſiveneſs of this trope, that there are no things in nature ſo contrary, but may come within the limits of it, and be accommodated to each other in a way of ſimilitude. In the laſt example, a natural action is applied to what is artificial.

A third ſort of metaphors is, when inanimate things are applied to animals, on account of ſome like properties between them. Thus Homer calls Ajax, *the bulwark of the Greeks*, on account of his valour, which like a wall defended them from the Trojans. And nothing is more common with Cicero, than to brand ill men with the character of being *the peſt of the ſtate*, by reaſon of the miſchief which they bring to the public. So likewiſe he calls Zeno the philoſopher *an acute man*, for his great diſcernment and quick perception of things; fetching the alluſion from metals when brought to an edge or a point. As on the contrary, old Chremes in Terence calls himſelf a *ſtone*, for want of apprehenſion. And we ſay, *a gay perſon*, and *a bright genius*, by this kind of metaphor.

The fourth and laſt kind of metaphors is that by which the actions and other attributes of animals are accommodated to inanimate things. Thus Cicero, ſpeaking of Clodius, ſays: "The very altars, when they ſaw that monſter fall, ſeemed to move themſelves and aſſert their right againſt him." Here the words *ſaw*, *move*, and *aſſert*, are all metaphors taken from the properties of animals. And Virgil, when he would repreſent the impetuous force and rapidity of the river Araxes, ſays, *it diſdained a bridge*. And it is a very uſual epithet, which Homer gives to words, to call them ϖτεροεντα, or *winged*, to intimate the ſwiftneſs of ſpeech.

Laſtly, as to the choice of metaphors, thoſe are eſteemed the fineſt and ſtrongeſt, which *give life and action to inanimate things*. The reaſon of which is, becauſe they do as it were invigorate all nature, introduce new forms of beings, and repreſent their images to the ſight, which of all the ſenſes is the quickeſt, moſt active, and yet moſt unwearied. What can be more moving, or in ſtronger terms expreſs the villany of Clodius, than when Cicero ſays, "The very altars of the gods ſeemed to exult at his death." And the ſame great orator particularly commends thoſe metaphors, for their ſprightlineſs and vivacity, which are taken from the ſenſe of ſeeing; as when we ſay *a bright thought*, or *a gay expreſſion*.

However, care muſt be taken not to venture upon too bold and daring metaphors. Poets indeed claim greater liberty in this reſpect, whoſe view is often to amuſe, terrify, or delight, by heightening the juſt and natural images of things. But it is expected the orator ſhould reaſon coolly, though ſtrongly and forcibly; and not by theatrical repreſentations ſo tranſport the mind, as to take it off from reflection, unleſs perhaps on ſome particular occaſion. And yet on the other hand, metaphors ought not to ſink below the dignity of what they are deſigned to expreſs; but the idea they convey ſhould at leaſt be equal to the proper word in the place of which they are ſubſtituted.

But there is a very great difference in the choice of metaphors, as they are deſigned either to praiſe or diſpraiſe. One thing may be compared to another in a great variety of reſpects. And the ſame thing may be made to appear either noble or baſe, virtuous or vicious, by conſidering it in a different light. Such metaphors, therefore, as are choſen to commend, muſt be taken from great and laudable things; and on the contrary, thoſe which are deſigned to diſcommend, from things vile and contemptible. Ariſtotle gives us a very pleaſant example of this in the poet Simonides. A certain perſon, who had carried the prize at a race of mules, offered him a a reward to write a poem in honour of that action. Simonides thought he did not bid high enough; and therefore put him off with ſaying, the ſubject was too mean to write in praiſe of mules which were the offspring of aſſes. But upon his being offered a larger, ſum he undertook the taſk; and, as Ariſtotle obſerves, when he has occaſion to ſpeak of the mules in that poem, he does not mention them by that name, but calls them *the daughters of fleet and generous horſes*, though he might with as much propriety have called them *the daughters of dull aſſes*. But it was the poet's buſineſs, in praiſing, to take the moſt advantageous part of the character. Where things are capable of ſuch different turns, metaphorical expreſſions are generally moſt beautiful. And ſometimes the ſame metaphor may be applied contrary ways, both in praiſe and diſpraiſe, as it will ſuit different properties of the thing to which it refers. So a *dove*, in a metaphorical ſenſe, may repreſent either *innocence* or *fear*; and an *iron heart* may denote either *courage* or *cruelty*; as an *hard head*, *ſtrength* or *weakneſs* of *thought*. And this ambiguity in the application of metaphorical words, often affords occaſion for jeſts and conciſe wit. We obſerved before, that Cicero never calls ill men, *lights of the ſtate*. But he once in this manner calls Sextius Clodius, *the light of the ſenate*. For, when his kinſman Publius Clodius had been killed by Milo, and his corpſe was brought to Rome, Sextius raiſed the mob, and in a tumultuous manner carried it into the ſenate-houſe, where they burnt it, and by that means ſet the building on fire: For which ſeditious action Cicero paſſes that joke upon him, under the metaphor of light, which elſewhere he always uſes in a good ſenſe.

But to proceed: All forced and harſh metaphors ſhould be avoided, the one being no leſs diſagreeable to the mind than the other to the ear. Nor ſhould they come too thick in a diſcourſe. In a word, they ought not to be uſed, but either where a proper word is wanting, or they are more ſignificant or beautiful than the proper word.

51 II. *Metonymy*. This, as defined by Quintilian, is, *the putting one word for another*. But Voſſius deſcribes it more fully, when he calls it, "A trope, which changes the name of things that are naturally united, but in ſuch a manner as that one is not of the eſſence of the other." That a metonymy is thus diſtinguiſhed from the other tropes, has been ſufficiently ſhewn already in the two laſt chapters. When it is ſaid, *to put one word for another*, or, *to change the names of things*, the meaning is, that the word ſo uſed changes its ſenſe, and denotes ſomething different from its proper ſignification. Thus, when *Mars* is put for *war*, and *Ceres* for *corn*, they loſe their perſonal ſenſe, and ſtand for the effects of which thoſe deities were ſaid to be the cauſe. So likewiſe, when Virgil ſays,

He drank the frothing bowl,

the word *bowl* muſt neceſſarily ſignify the liquor in the bowl. And when in another place, deſcribing the temple of Juno at Carthage, in which the actions of the Trojan war were repreſented, and the images of the heroes, he makes Æneas, upon diſcovering that of Priam among the reſt, cry out,

Lo here is Priam;

it is plain the word *Priam* there muſt ſtand not for his perſon, but his *image* or *figure*. And this property of changing the ſenſe of the word appears peculiar to metonymy. In treating upon a metaphor, we obſerved the miſtake of thoſe who teach, that a word uſed metaphorically loſes its proper ſignification; whereas it only changes its place, but not its ſenſe; being applied to a thing to which it does not naturally belong, by way of ſimilitude. And as the not attending to this has run ſome perſons into very great abſurdities, in treating upon metaphorical expreſſions, and reaſoning from them in the tropical ſenſe; ſo the like has happened to others in ſome inſtances of a metonymy, where, by miſapprehending their true nature, they have reaſoned from them in the literal ſenſe, as we ſhall ſhew preſently. A metonymy is not ſo extenſive as a metaphor, nor altogether ſo neceſſary: becauſe nothing is ſaid by a metonymy, which cannot be expreſſed in proper words; whereas metaphors are often uſed for want of proper words to expreſs ſome ideas. However, metonymies are very uſeful in language; for they enrich a diſcourſe with an agreeable variety, and give both force and beauty to an expreſſion. And what we obſerved with relation to a metaphor, is true alſo of this trope; that ſome metonymies, even in common diſcourſe, are more frequently made uſe of than the proper words in whoſe room they are put. So, *pale death*, *a blind way*, and *a happy ſtate*, are very common expreſſions with us. And it is more uſual to ſay, *This is ſuch a perſon's hand*, or *I know his hand*, than his writing, when we intend this latter ſenſe of the word.

We now proceed to the diviſion of metonymies; which are commonly diſtinguiſhed into four kinds, from the different manner in which things are naturally, but externally, united to one another. Now things are thus united, or one thing depends upon another, either with reſpect to its production, or in the manner of its exiſtence when produced. In the former way the effect depends upon its cauſe, and in the latter the adjunct upon its ſubjects. And hence ariſe four ſorts of metonymies, which receive their names from the *cauſe* and *effect*, the *ſubject* and the *adjunct*.

It is called a *metonymy* of the *cauſe*, when the external cauſe is put for the effect. The external cauſe is twofold, the agent and end, which are uſually called the *efficient* and *final cauſe*. Of the former kind are ſuch metonymies, where the inventor or author is put for what was invented or effected by him. Thus, as we ſaid before, *Ceres* is ſometimes put for *corn*, the uſe of which ſhe was ſaid firſt to have introduced; and *Mars* for *war*, over which he was thought to preſide. And by this way of ſpeaking, any artiſt or writer is put for his work. So Juvenal, blaming the luxury and profuſeneſs of the Romans, ſays: *There are few tables without Mentor*; that is, which were not made by him, or after his manner. And our Saviour ſays in the parable of the rich man and Lazarus, *They have Moſes and the prophets*; meaning, the books of Moſes and the prophets. But under this ſort of metonymy is included not only the agent, ſtrictly ſo called, but alſo any means or inſtruments made uſe of in the doing of a thing, when put for the thing done. Thus, *polite literature* is called *humanity*, becauſe it cultivates and improves the human mind. And in that expreſſion of Cicero, *Words move nobody but him who un-*

underſtands the tongue; the word *tongue*, which is the inſtrument of ſpeech, is put for *ſpeech*, or *language*. And in the like ſenſe, *arms* are ſometimes put for *war*, and the *ſword* for *ſlaughter*. By the ſame kind of metonymy, likewiſe, any affection or quality is put for its effect. As when it is ſaid, *the end of government is to maintain juſtice;* that is, *ſuch mutual offices among men, as are the effects of juſtice*. And ſo likewiſe in that of Cicero, *It is the buſineſs of magiſtrates to check the levity of the multitude;* by which he means tumults occaſioned by their levity. Moreover, as human affections are attributed to the Deity in a metaphorical ſenſe, ſo ſeveral parts of the human body are likewiſe aſcribed to him by this kind of metonymy. Thus, his *hand* and his *arm* are uſed to expreſs his *power;* as his *ear* and *eye*, his *care* and *providence;* theſe being the inſtruments of ſuch effects in mankind. Metonymies of the final cauſe are thoſe, by which the end in doing a thing is put for the thing done. As when we ſay, *The watch is ſet*, meaning the *watchmen*, who are appointed for that purpoſe. And ſo likewiſe that expreſſion, *to make an example*, as it ſignifies to *puniſh*, in order to deter others from the like crimes by ſuch an example. As alſo that of Virgil,

Phillis ſhould garlands crop,

by which are meant *flowers* to make garlands.

The ſecond kind of metonymy puts the effect for the efficient cauſe, whether the agent, or only the means and inſtrument. So Virgil calls the two Scipios *the deſtruction of Libya*, becauſe they were the agents who effected it. And Horace compliments his patron Mæcenas with the titles of being *his guard and honour;* that is, his guardian, and the author of his honour. But when Cicero tells the citizens of Rome, that *the death of Clodius was their ſafety*, he means the occaſion only of their ſafety. And elſewhere he calls that *a dark hope and blind expectation;* the effect of which was dubious and uncertain to thoſe who entertained it. And in like manner, the ſons of the prophets, when they were eating the pottage which Eliſha had ordered to be ſet before them, cried out, *There is death in the pot;* that is, *ſome deadly thing*, as is preſently after explained. And thus ſweat, which is the effect of labour, is ſometimes put for labour. As in the threat denounced againſt Adam, *In the ſweat of thy face ſhalt thou eat bread;* that is, by labour in cultivating the ground. And, in alluſion to this way of ſpeaking, Anthony the orator tells Craſſus, "the improvement of the ſtyle by conſtant exerciſe, as he preſcribed, was a thing of much ſweat." And *virtue is ſaid to be gained by ſweat*, that is, continued care and exerciſe in ſubduing the paſſions, and bringing them to a proper regulation. But in theſe two expreſſions there is likewiſe a metaphor, the effect of bodily labour being applied to that of the mind. In all theſe inſtances, the effect is put for the efficient cauſe.

The third kind of metonymy is, when the ſubject is put for the adjunct. By ſubject here, in a large ſenſe of the word, may be underſtood that wherein ſome other thing is contained, or about which it is converſant; as likewiſe the poſſeſſor with reſpect to the thing he poſſeſſes; and the thing ſignified, when put for the ſign of it. Now, by the firſt of theſe ways of ſpeaking, the ſeat of any faculty or affection, is uſed for the faculty or affection itſelf. So it is uſual to ſay, *a man of a clear head*, when we mean a clear mind or underſtanding; the ſeat of the mind being in the head. And a perſon is ſaid *to have a warm heart*, becauſe the heart has been thought the ſeat of the affections. In like manner, the place where any actions are performed, is put for the actions done in it. As when Cicero ſays, "Do not always think of the forum, the benches, the roſtra, and the ſenate;" meaning the diſcourſes which were uſually made in thoſe places. So likewiſe the contrary, or place of reſidence, is put for the inhabitants, as in that paſſage of Cicero: "And to omit Greece, which always claimed the preeminence for eloquence, and Athens, the inventreſs of all ſciences, where the art of ſpeaking was invented and perfected; in this city of ours, (meaning Rome), no ſtudies have prevailed more than that of eloquence." Where the words Greece and Athens ſtand to denote the inhabitants of thoſe places. And hither may alſo be referred thoſe expreſſions in which the time is put for the perſons living in it; as, *the degeneracy of the preſent age, the virtue of former times*. In the ſecond way above-mentioned, the object is uſed for the perſon, or thing employed about it: As when Cicero ſays, "In time of battle the laws are ſilent;" where by *laws* he intends the *judges*, who pronounce ſentence according to law. By the third of theſe ways, in which the poſſeſſor is put for the thing he poſſeſſes, we ſay, *to devour*, *deſtroy*, or *ruin a man;* meaning, not his *perſon*, but his *eſtate*. And mythologiſts explain the fable of Acteon by this trope, who is ſaid to have been devoured by his dogs: for by dogs they underſtand flatterers and paraſites, who conſumed his eſtate, and brought him to beggary. By the laſt way before recited, which puts the thing ſignified for the ſign, ſtatutes and pictures are called by the names of the perſons which they repreſent; as in that jeſt of Cicero upon his brother Quintus, when, as Macrobius relates, "being in the province which his brother had governed, and ſeeing a large portrait of part of his body, holding a ſheild, though Quintus was but a little man, he ſaid, My half brother is bigger than my whole brother." The Popiſh doctrine of tranſubſtantiation is founded upon an abuſe of this trope. For when our Saviour, ſpeaking of the bread and wine at that time before him, ſays, "This is my body, and this is my blood;" his plain meaning is, they were the ſigns of his body and blood, the thing ſignified being put for the ſign by this ſort of metonymy. But the Papiſts take the expreſſion literally, which muſt doubtleſs be very abſurd; ſince the words relate to the time then preſent, while Chriſt was yet living, and ſpoke them; when it was impoſſible for the bread and wine to be converted into his body and blood, it being evident to all who were preſent, that thoſe elements, and his body, exiſted ſeparately at the ſame time. But if the words are explained by this trope, the ſenſe is plain and eaſy, and the way of ſpeaking familiar to all writers. Whereas they who plead for the literal ſenſe might with equal reaſon aſſert, that thoſe expreſſions above-mentioned are to be taken literally, in which ſeveral parts of the human body, as the hand, the arm, the ear, and the eye, are aſcribed to the Deity; or that, when our Saviour in a metaphorical ſenſe calls himſelf *a vine*, and *a door*, theſe words were deſigned to be applied to him ſtrictly and properly, and not by way of ſimilitude only, as is the caſe in all metaphors.

The fourth kind of metonymy is that wherein the adjunct is put for the ſubject, which is done in the ſame variety of ways as the former. It is therefore a metonymy of the adjunct, when the thing contained is put for that which contains it. As when Virgil ſays, "They lie down upon purple;" that is, upon couches dyed with purple. And again, "They crown the wine;" meaning the bowl which contained the wine, it being the cuſtom of the ancients to deck their bowls with garlands at their entertainments By theſe tropes likewiſe virtues and vices are put for the perſons in whom they are found. As in that beautiful paſſage of Cicero, where, comparing the profligate army of Catiline with the forces of the ſtate, he ſays, "On this ſide modeſty is engaged, on that impudence; on this chaſtity, on that lewdneſs; on this integrity, on that deceit; on this piety, on that profaneneſs; on this conſtancy, on that fury; on this honour, on that baſeneſs; on this moderation, on that unbridled paſſion: in a word, equity, temperance, fortitude, prudence, and all virtues, engage with injuſtice, luxury, cowardice, raſhneſs, and all vices." And to this trope thoſe expreſſions are to be referred, in which any thing is put for the object about which it is converſant. As in that ſaying of the wiſe man, "Hope deferred makes the heart ſick;" where hope is put for the thing hoped for. And thus Suetonius calls the emperor Titus *the love and delight of mankind*, whoſe mild and obliging temper rendered him the object of thoſe agreeable affections to all perſons under his government. A third uſe of this trope is by putting a thing for the time in which it was done. Thus we ſay of a perſon, *he has ſerved ſo many campaigns;* meaning ſo many ſummers, that being the uſual time in which armies are drawn out into the field. Laſtly, by this metonymy, the ſign is put for the thing it ſignifies; as, *the ſceptre* for *the regal dignity*, and *the ſword* for *the authority of the magiſtrate*.

52 III. *Synecdoche.* This is a trope by which either the whole of a thing is put for a part of it, or a part for the whole; ſo that the two things, whoſe ideas are preſented to the mind in this trope, are internally related to each other: by which, as has been ſhewn already, it is diſtinguiſhed from all the other tropes. In a *ſynecdoche* the word retains its proper ſenſe, and the expreſſion is elliptical, as will appear by the ſeveral ſpecies of it, wherein the ellipſis in moſt of the examples is very obvious, and may with no great difficulty be ſupplied. Now a thing may be conſidered as an whole in three different reſpects, which logicians call an *univerſal*, *eſſential*, and *integral whole*. An univerſal whole is any genus with regard to its ſeveral ſpecies: as, an *animal* with reſpect to *mankind* and *brutes;* or *philoſophy*, with reſpect to the ſeveral *arts* and *ſciences* compriſed under it. An eſſential whole conſiſts of matter and form; as, a *man* of *body* and *ſoul*. And an integral whole is any body or quanity, with reſpect to the ſeveral parts of which the matter of it is compoſed, and into which it may be divided: as, an *human body* with reſpect to its *ſeveral members;* or a *year*, as diviſible into *months*, *weeks*, and *days*. And thus rhetoric is an integral whole in reſpect to the four parts that compoſe it, namely, invention, diſpoſition, elocution, and pronunciation. So likewiſe any aggregate body, as a civil community, which is diviſible into thoſe who govern and are governed; or any army, conſiſting of the general, and his ſoldiers. As an whole therefore, in each of theſe acceptations of the word, is frequently put for a part, and a part for the whole; hence ariſe ſix ſpeces or ſorts of ſynecdoche.

The firſt of theſe puts the genus for the ſpecies. Thus, virtue in general is ſometimes uſed to denote ſome particular ſort of virtue. As when Cicero mentions virtue as one of the four qualifications neceſſary in a general, he means greatneſs of mind. And ſo perſons are often commended for inſtances of virtue ſhewn in their conduct, which reſpect only ſome ſingle virtue, as juſtice, temperance, or the like: And in this ſenſe Cicero calls Clodius *a deadly animal*. So when our Saviour commiſſions his apoſtles to *preach the goſpel to every creature*, the meaning is, *every rational creature*. And thus likewiſe, *to talk to a perſon*, ſometimes denotes the ſame thing as to *blame* him, which is one way of talking.

The ſecond kind of ſynecdoche puts the ſpecies for the genus. Thus *bread* denotes any kind of food; as when a perſon is ſaid *to get his bread by his labour*. In the ſame way of ſpeaking, *money* is put for any kind of wealth in general. And it is an uſual expreſſion to ſay, that *wine deſtroys more than the ſword;* that is, than any *hoſtile arms*. And the legal form of baniſhment among the Romans was, to prohibit perſons *the uſe of fire and water;* that is, *the moſt common and ordinary neceſſaries of life*, in which all others were included.

The third ſpecies of this trope is, when the eſſential whole is put for one of its parts; that is, either for the matter or form. Thus, in the evangeliſt, Mary Magdalen ſays, *They have taken away my Lord, and I know not where they have laid him;* meaning his *body*. So it is uſual to ſay of a deceaſed perſon, *He was buried at ſuch a time*. And in the inſcriptions of ſepulchral monuments we frequently meet with this expreſſion, *Here lies ſuch an one;* that is, his *corpſe*. Nor are inſtances uncommon in which the whole being is put for the form. Thus when Cicero ſays, *Thoſe perſons live, who have fled from the confinement of the body, as from a priſon;* by *perſons* muſt neceſſarily be underſtood their *ſouls*, which are here diſtinguiſhed from and ſet in oppoſition to their *bodies*. And ſo Virgil repreſents Æneas as meeting with Dido and ſome of his Trojan friends in the infernal regions; by which are meant their *ghoſts*.

The fourth kind of ſynecdoche is, when either the matter or form is put for the whole being. Thus *ſilver* and *gold* are uſed to ſignify money made of thoſe metals; as when we ſay, *I have ſo much ſilver*, or *ſo much gold*. And the word *ſoul*, both in our own and other languages, is put for the *whole perſon*. So with us, *a merry ſoul*, and *a dull ſoul;* in Cicero, *dear ſouls;* and in Horace, *candid ſouls*, are all uſed in this tropical ſenſe. But this way of ſpeaking occurs nowhere more frequently than in the ſacred writings. Thus, for inſtance, it is ſaid, *All the ſouls which came with Jacob into Egypt*, meaning the *perſons*. And again, *The ſoul that ſinneth it ſhall die:* from which expreſſion, and others of the like import, ſome perſons, by not attending to the nature of this trope, have been erroneouſly led to infer that the ſoul is naturally mortal. But ſometimes only part of the matter ſtands to expreſs the whole eſſence or being. So we imitate the Latins in uſing the word *caput* or *head* to denote either a *perſon* or *thing*. For, as with them *lepidum caput*, ſo with us *a witty head*, ſignifies the ſame as *a man of wit*. And in the ſame ſenſe, *ſo many head of cattle* means *ſo many entire cattle*.

By the fifth ſort of ſynecdoche, the whole of any material thing or quantity, whether continued or diſcrete, is put for a part of it. So when Cicero ſays, *A war is kindled through the whole world*; in compliment to his country, he calls the Roman empire *the world*. And this expreſſion is alſo uſed by hiſtorians. Thus Cornelius Nepos, ſpeaking of the quarrel between Mark Authony and Auguſtus, tells us, that *each of them deſired to be lord of the world*. And in like manner St Luke ſays, *There went out a decree from Cæſar Auguſtus, that all the world ſhould be taxed*. So in St Paul's ſhipwreck, it is ſaid, *They ran the ſhip aground*, that is, *the head of her*; for it is plain by what follows, that the ſtern was looſe. And as to diſcrete quantity, our Saviour, uſing this trope, ſaid he ſhould be *three days and three nights in the heart of the earth*. Though he did not continue three whole days and nights in the grave, but only part of the firſt and third day, and the whole ſecond day, with the two whole nights between the firſt and third day, according to our way of reckoning. For he was buried on Friday in the afternoon, and reſted in the grave that night, with the following day, which was the Jewiſh Sabbath, and was riſen on the morning of the next day. So that we muſt neceſſarily have recourſe to this ſynecdoche, which puts the whole for the part, to clear up that event.

By this kind of ſynecdoche, alſo, the plural number is ſometimes put for the ſingular. Thus St Matthew ſays, *The thieves who were crucified with our Saviour reviled him:* though it is plain from St Luke, that only one of them did ſo. It may alſo be referred to this trope, when a certain number is put for an uncertain one. So it is an uſual way of expreſſion to ſay, *I have ſeen or done ſuch a thing an hundred or a thouſand times*; when perhaps ſo many are not really intended, but only in general ſome conſiderable number.

The ſixth and laſt kind of ſynecdoche puts a part of any material thing or quantity for the whole of it. So we ſay of a man, *He ſhelters himſelf under ſuch an one's roof*; that is, *in his houſe*. And of a fleet, that it *conſiſts of ſo many ſail*; meaning, *ſo many ſhips*. And by this trope, that is aſcribed to a ſingle perſon, which was done by the aſſiſtance of others, and in conjunction with them. As when it is ſaid, that *Hannibal killed forty thouſand Romans at the battle of Cannæ:* For an army is an aggregate body, of which the general is the head, and conſequently the chief part of it. And to this kind of ſynecdoche may alſo be referred ſuch expreſſions in which the ſingular number is put for the plural: as if one ſhould ſay, *A man is liable to be miſled by the influence of irregular paſſions*; meaning *all men*, or *mankind in general*. Or when leſs than the real number is put for any round number. Thus ſome ancient writers, when they ſpeak of the Grecian armada that came againſt Troy, call it a fleet of *a thouſand ſhips*; though, according to Homer's liſt, it contained 1186. And ſo likewiſe the Greek interpreters of the Old Teſtament are uſually called the *Seventy*; whereas, in reality, they were ſeventy-two.

53 IV. *Irony*. This is *a trope in which one contrary is ſignified by another:* As if any one ſhould ſay, *Well done*; when at the ſame time his deſign is to intimate that the thing was *ill done*. So that, by this manner of expreſſion, the ſpeaker appears to mean ſomething contrary to the ſenſe of the word he makes uſe of. Not that the word is changed from its uſual ſignification; but by the circumſtances attending the expreſſion, we perceive the contrary to what is ſpoken is intended. Quintilian obſerves, that an irony may be known one of theſe three ways: "By the manner of pronunciation, or from the nature of the perſon or the thing. For (as he adds) where any of theſe do not ſuit with the words, it is plain the ſpeaker intends the contrary." The irony is very plain from the manner of pronunciation in that paſſage of Terence, where Simo ſpeaking to his ſervant by way of reproof, ſays, "You have taken great care indeed." From the circumſtances of the perſon, when Cicero, addreſſing to Catiline, ſays, "He went to your companion, that *excellent man*, Marcus Marcellus." When he calls him an *excellent man*, it is evident he means the contrary; becauſe no good man would be a companion of Catiline. And when he begins his oration for Ligarius with ſaying, "Cæſar, this is a *new* crime, and never heard of till now," the thing he is ſpeaking of ſhews it to be an irony; for it was not new, as all who were preſent very well underſtood.

The ſubjects of irony are vices and follies of all kinds. And this way of expoſing them is often more effectual than ſerious reaſoning: For many perſons, who, either from temper or want of reflection, cannot be moved by the force of an argument, are not proof againſt the poignancy of wit and raillery. And therefore we find the moſt grave and ſerious perſons have not declined the uſe of this trope upon proper occaſions. Socrates, whom the oracle pronounced the wiſeſt man of his age, gave ſo much into it, that he got the name of ειρων, that is, the *droll*. In the ſacred writings we have a remarkable inſtance of it in the prophet Elijah, where he challenges the prieſts of Baal to prove the truth of his deity: For it is ſaid expreſsly, "He mocked them, and ſaid, Cry aloud, for he is a god; either he is talking, or he is purſuing, or he is on a journey, or peradventure he ſleepeth, and muſt be waked." And Solomon takes the like method to expoſe the follies of youth by this ironical apoſtrophe, "Rejoice, O young man, in thy youth," with what follows, which is all ironical. Nay, our Saviour himſelf thought fit thus to reprove the Jewiſh doctors, when he ſays, "Full well ye reject the commandment of God, that ye may keep your own tradition:" Where, by the words *full well*, or, as it is in the original, καλως, it is very evident that a ſevere reprimand was intended.

An irony is uſed on a variety of occaſions, as we ſhall ſhew from ſome inſtances in Cicero. Sometimes he applies it in a way of jeſt and banter: As when he ſays, "We have much reaſon to believe the modeſt man would not aſk him for his debt, when he purſues his life." At other times by way of inſult and deriſion:

ſion: Thus when he would repreſent the forces of Catiline as mean and contemptible, “O terrible war, (ſays he) in which this band of rakes are to march under Catiline! Draw out all your garriſons againſt this formidable body.” Again, at other times, to give the greater force to his argument, he would ſeem as it were by this trope to recall and correct what he had ſaid before; as in his oration for Milo: “But it is fooliſh in us to compare Druſus, Africanus, Pompey, and ourſelves, with Clodius; all our calamities were tolerable, but no one can patiently bear the death of Clodius.” Now the character of Clodius was ſo well known, that all who were preſent muſt be ſenſible he meant the contrary. And, to name no more, an irony is never uſed to greater advantage, than when it is followed immediately by ſomething very ſtinging. Thus, ſpeaking of Piſo, he ſays, “You have heard this philoſopher: he denies that he was ever deſirous of a triumph.” And then addreſſing himſelf to him, he immediately adds, “O wretch! when you deſtroyed the ſenate, ſold its authority, ſubjected your conſulate to the tribune, overturned the ſtate, betrayed my life and ſafety for the reward of a province; if you did not deſire a triumph, what can you pretend you did not deſire?” This muſt effectually confound the falſe gravity at that time aſſumed by Piſo.

Art. II. Secondary Tropes.

Secondary tropes are ſo called, becauſe they are all of the ſame nature with the former, and may be referred to ſome or other of them, though they have received different names.

They are chiefly eight in number; *Antonomaſia*, *Communication*, *Litotes*, *Euphemiſm*, *Catachreſis*, *Hyperbole*, *Metalepſis*, and *Allegory*. The three firſt of theſe are ſimple tropes, and may all be referred to a *Synecdoche*. But the five laſt are of a mixed or complex nature, and not confined to any one of the primary tropes; as will appear in treating upon them in order.

54 I. A common or general word is ſometimes uſed for the proper name of ſome particular thing or perſon which upon any account is eminent and remarkable. So we ſay, *He is gone to the city*, or *he came from the city*, that is, *London*. And by the *Scriptures* we mean the *Bible*. So likewiſe in ſpeaking of perſons, *the orator* is uſed for Cicero, *the poet* for Homer or Virgil, and *the philoſopher* for Ariſtotle: and it is not unuſual to ſay *the apoſtle*, when we mean St Paul. On the contrary, the proper names of things or perſons are ſometimes applied to any other of the ſame character. Thus we uſe the word *goſpel* for any certain and undoubted truth. And *Carthaginian faith* proverbially ſtood for the greateſt falſehood and deceit among the Romans. With the Greeks, *Hercules* ſignified a *ſtrong man*, *Neſtor* a *wiſe man*, and *Irus* a *beggar*; and the names of *Samſon*, *Solomon*, and *Job*, now anſwer the like characters. Both theſe ways of expreſſion are often very emphatical, and heighten the idea more than where things are expreſſed by their own name. To call a good orator *Cicero*, or an excellent poet a *ſecond Virgil*, includes not only an encomium from the arts themſelves, but leads the mind to what is moſt perfect in them, and was peculiar to thoſe perſons. Theſe forms of ſpeech are called *antonomaſia*, and come properly under a ſynecdoche; for in the former the whole is put for a part, and in the latter a part for the whole.

55 II. Nothing is more common with orators, than a change of perſons. Sometimes, to avoid envy, and prevent the imputation of pride, in aſſuming to themſelves the praiſe of any laudable action, they aſcribe it to their hearers, and do not ſay, *we*, but *ye did ſo and ſo*. At other times, when it is neceſſary to remind them of ſomething which they have done amiſs, or to caution them againſt ſome wrong ſtep for the future; to prevent giving offence, they take it upon themſelves, or at leaſt join themſelves with them, and do not ſay, *you have done this*, or *do not you do this*; but, *we have done it*, or *let us not do it*. And again, at other times, in compliment to their hearers, they join them as partners in the commendable actions or virtues of other perſons; as when the whole body of the people is brought in to ſhare the praiſe ariſing from the ſucceſs of wiſe counſels or victorious arms. Such ways of ſpeaking often occur both in Demoſthenes and Cicero. They are called *communication*, and come properly under a ſynecdoche of the whole.

56 III. On the contrary, there is a mode of ſpeech, in which, by denying the contrary, more is intended than the words expreſs. This way of ſpeaking is called *litotes*; and is often uſed for modeſty ſake where a perſon is led to ſay any thing in his own praiſe, or to ſoften an expreſſion which in direct terms might ſound harſh or give offence. As if one ſhould ſay, *I do not commend you for that*; meaning, *I greatly diſcommend* or *blame you for it*. Where more being underſtood than the words expreſsly denote, it is properly a ſynecdoche of the part. Not that this manner of ſpeaking is always to be ſo interpreted; but where it is not, there is no trope; which muſt be judged of by the circumſtances of the diſcourſe. But that it frequently is ſo uſed, might be eaſily ſhewn from many inſtances; though it will be ſufficient to mention two or three. Cicero ſpeaking of Cotta, calls him *no mean orator*, whom he had juſt called *a very great orator*. And he ſays of Varro, that, “he purſued his ſtudies not without induſtry;” and afterwards gives him the character “of a man of the greateſt application.” Which paſſages, compared together, plainly ſhew the import of thoſe negative expreſſions. And a friend of Cicero, writing to him, begins his letter thus: “Although I am ſenſible the news I ſend you will not be very pleaſant.” This news was concerning the death of another friend of Cicero's; and there by the words *not very pleaſant*, muſt to be ſure be meant *very unpleaſant and melancholy*; but he choſe that expreſſion in the beginning of his letter, as the ſofteſt and leaſt ſhocking, the better to prepare him for the following account of what that news was. And this way interpreters explain that paſſage in St Matthew: *And thou Bethlehem in the land of Juda are not the leaſt among the princes of Juda*; where, by *not the leaſt*, they underſtand the *greateſt*, or *very great*, upon account of the honour it received by the birth of our Saviour, as the words immediately following plainly intimate.

57 IV. When any diſpleaſing or ungrateful thing is expreſſed by a more ſoft and agreeable word, it is called *euphemiſm*. And as the word made uſe of is either

contrary to the proper word, or only different from it, it may be referred to different tropes. The Latins have a ſoft way of expreſſing their diſregard to a perſon, by ſaying *valeat;* which we have borrowed from them, and ſay, *fare him well.* When the contrary being intended to what is expreſſed, it comes properly under an *irony.* And as the word *death* carries in it an idea that is diſagreeable to human nature, inſtead of ſaying a perſon is dead, we often ſay *he is deceaſed,* or *departed;* which we have alſo taken from the Latins, who uſe the words *deceſſit* and *obiit,* in the ſame ſenſe. So that in both languages it comes under a ſynecdoche of the whole; to depart out of life being one ſort of departure. But when the evangeliſt ſpeaking of Stephen, who was ſtoned to death, expreſſes it by ſaying that *he fell aſleep;* this is a beautiful metaphor, taken from the ſimilitude between the death of a good man and ſleep.

58 V. *Catachreſis* ſignifies in general any harſh trope, though it is moſt commonly found in metaphors. It is principally uſed by poets, who make choice of it for novelty, or to enforce an expreſſion, where the proper word does not ſeem ſtrong enough. As when Milton, in deſcribing the angel Raphael's deſcent from heaven, ſays, he

> Sails between worlds and worlds;

where the novelty of the word enlivens the image more than if he had ſaid *flies.* But it is ſometimes found in the graveſt authors, and even in the ſacred writings. So we read of the *blood of the grape.* And Solomon ſays, *the horſe-leech hath two daughters.* In all theſe inſtances the trope is a metaphor. But when St John ſays in the Revelations, *I turned to ſee the voice that ſpake to me,* it is here a metonymy of the adjunct; the word *voice* being put for the perſon who uttered it. In St Matthew we read of *Simon the leper;* not that he was then a leper, but had been ſo, and was cured; which is a *ſynecdoche* of the part. And when a criminal is ſaid *to have had his reward,* that is, his puniſhment, it is an *Irony.*

59 VI. *Hyperbole* is the boldeſt of all tropes; for it exceeds the ſtrict bounds of truth, and repreſents things either greater or leſs, better or worſe, than they really are. But the repreſentation is made in ſuch a manner as not to impoſe on the hearers. For an *hyperbole* is not uſed to define or deſcribe any thing accurately, but only to magnify or depreſs it in a conſiderable degree, when we either cannot or do not chooſe to repreſent it exactly. The exceſs in this trope is called *auxeſis;* as when we ſay of any thing that is very high, *it reaches to the ſkies.* The defect, or contrary extreme, is termed *meioſis:* So we ſay of a very lean perſon, *he is nothing but ſkin and bones,* or *a mere ſkeleton.* It is principally metaphorical, but ſometimes taken from other tropes. When Saul and Jonathan are ſaid to have been *ſwifter than eagles, and ſtronger than lions,* the expreſſion is founded in ſimilitude, and is therefore a metaphor. When, inſtead of ſaying Cato was a very virtuous man, the hiſtorian calls him *the image of virtue;* it is an hyperbolical metonymy of the adjunct for the ſubject. And when we read in the Moſaic hiſtory *of cities fenced up to heaven,* there is a *ſynecdoche.* But if a man of weak ſight be ſaid *to be eagle eyed,* it is an *irony.* Thoſe hyperboles which are expreſſed comparatively, are commonly moſt emphatical, becauſe they ſhew a peculiarity in the exceſs. To ſay a thing is *as light as a feather,* carries the idea very far; but to ſay *it is lighter,* not only carries it ſtill farther, but alſo heightens it, by leaving the mind at an uncertainty where to fix the limits.

60 VII. Sometimes two or more tropes, and thoſe of a different kind, are contained under one word; ſo that ſeveral gradations, or intervening ſenſes, come between the word that is expreſſed, and the thing deſigned by it. And this is called a *metalepſis.* The conteſts between Sylla and Marius proved very fatal to the Roman ſtate. Julius Cæſar was then a young man. But Sylla obſerving his aſpiring genius, ſaid of him, "In one Cæſar there are many Mariuſes." Now in this expreſſion there is a metalepſis. For the word *Marius,* by a *ſynecdoche,* or *antonomaſia,* is put for any ambitious and turbulent perſon; and this again, by a *metonymy* of the cauſe, for the ill effects of ſuch a temper to the public. So that Sylla's meaning, diveſted of theſe tropes was, that Cæſar would prove the moſt dangerous perſon to the Roman ſtate that ever was bred in it: Which afterwards proved true in the event. So when Virgil, deſcribing that part of the African coaſt where Æneas arrived with his ſhips, ſays, *A dark wood hung over it;* the word *dark,* by a metonymy of the effect, is put for *ſhady,* and that again by the ſame trope for *thick;* for his meaning is, a *thick wood.* But the words of Dido, in the ſame poet, contain a larger gradation, when ſhe ſays,

> Happy, ah truly happy had I been,
> If Trojan ſhips our coaſts had never ſeen.

In which expreſſion, firſt by a metonymy of the adjunct, the ſhips are put for the Trojans in the ſhips; and theſe, by a ſynecdoche of the whole, for Æneas, who was one of them; and again, his arriving on the coaſt, by a metonymy of the cauſe, for her ſeeing him; and laſtly, her ſeeing him, by the ſame trope, for the paſſion ſhe had for him. So that her meaning is, ſhe had been happy, if ſhe had never entertained a paſſion for Æneas. This trope is more frequently to be met with in poets than in orators, as they take greater liberty in uſing diſtant alluſions than is ſuited to that perſpicuity of expreſſion which is required in oratory. But as Quintilian has well obſerved, all the intermediate links of the chain in this trope are of no further uſe than to lead the mind gradually from the firſt to the laſt, the better to perceive their connection. As in the example laſt mentioned, relating to Dido, if we drop all the intervening ſteps, and connect the words expreſſed with what is directly intended, they will be found to contain a very remote cauſe put for the effect, which comes under a *metonymy.* On the contray, in the ſecond example, where *dark* ſtands for *thick,* the effect is put for a remote cauſe. And the firſt, which is founded in a ſimilitude of temper between Cæſar and Marius, belongs to a *metaphor.*

61 VIII. *Allegory.* As a metalepſis compriſes ſeveral tropes in one word, ſo this is a continuation of ſeveral tropes in one or more ſentences. Thus Cicero ſays, "Fortune provided you no field, in which your virtue could run and diſplay itſelf:" Where the words *field* and *run* are metaphors taken from corporeal things, and applied to the mind. And in another paſſage, ſpeaking of himſelf, he ſays, "Nor was I ſo timorous, that after I had ſteered the ſhip of the ſtate

through the greateſt ſtorms and waves, and brought her ſafe into port, I ſhould fear the cloud of your forehead, or your colleague's peſtilent breath. I ſaw other winds, I perceived other ſtorms, I did not withdraw from other impending tempeſts; but expoſed myſelf ſingly to them for the common ſafety." Here the ſtate is compared to a ſhip, and all the things ſaid of it under that image are expreſſed in metaphors made uſe of to ſignify the dangers with which it had been threatened. And indeed allegories generally conſiſt of metaphors; which being the moſt beautiful trope, a number of them well choſen and put together is one of the fineſt and brighteſt ornaments in language, and exceeds a ſingle metaphor in luſtre, as a conſtellation does a ſeparate ſtar. It is true, that allegories are ſometimes found in other tropes; but this is very rare. In that known expreſſion of Terence, the tropes are all metonymies: *Without Ceres and Bacchus Venus grows cold;* that is, diveſted of the tropes, *Without meat and drink, love dies.* And Samſon's riddle is made up of ſynecdoches; "Out of the eater came forth meat, and out of the ſtrong came forth ſweetneſs." But there is no ſmall ſkill required in the right management of allegories. For care ſhould be taken, that the ſame kind of trope be carried through the whole, ſo as to compoſe one uniform and conſiſtent ſet of ideas: otherwiſe they dreſs up a chimera, a thing that has no exiſtence, and of which the mind can form no perception. And, as Quintilian ſays very juſtly, "to begin with a tempeſt and end with a fire, would be very ridiculous and unnatural." It is likewiſe very neceſſary that the alluſions be all plain and evident, eſpecially where the name of the thing alluded to is not expreſſed. Theſe are called *pure allegories*. As that of Cicero: "So it happens, that I, whoſe buſineſs it is to repell the darts, and heal the wounds, am obliged to appear before the adverſaries have thrown any dart; and they are allowed a time to attack us, when it will not be in our power to avoid the aſſault; and if they throw a poiſonous dart, which they ſeem prepared to do, we ſhall have no opportunity to apply a remedy." The tropes here are all taken from military affairs, without any intimation what they are applied to. But that is plain from the context of the diſcourſe. For he is ſpeaking of the diſadvantages he laboured under in defending his client againſt thoſe of the oppoſite ſide, and ſo applies to the bar thoſe terms which were proper to the field. But where the reference is not evident, it becomes a riddle; which is nothing elſe but an obſcure allegory. To avoid this, therefore, the beſt writers generally uſe what they call *mixed allegories;* that is, ſuch wherein the proper name of the thing is expreſſed, which the whole ſimilitude reſpects. Of this kind is that in the ſpeech of king Philip of Macedon, given us by Juſtin, where he ſays, "I perceive that cloud of a dreadful and bloody war ariſing in Italy, and a thunder-ſtorm from the weſt, which will fill all places with a large ſhower of blood, wherever the tempeſt of victory ſhall carry it." The proper words *war, blood,* and *victory,* being joined to the tropes *cloud, ſhower,* and *tempeſt,* in this ſentence, render the ſeveral parts of the ſimilitude plain and evident. Quintilian thinks thoſe allegories moſt beautiful, where the whole ſimilitude is expreſſed, and thoſe words, which in their proper ſenſe relate to one of the two things between which the compariſon is made, are allegorically applied to the other: As when Cornelius Nepos ſays of Atticus, "If that pilot gains the greateſt reputation who preſerves his ſhip in a boiſterous and rocky ſea; ought not he to be thought a man of ſingular prudence, who arrived in ſafety through ſo many and ſo great civil tempeſts?" Theſe are the allegories with which orators are chiefly concerned.

§ 2. *Of Figures.*

61 THIS term ſeems to have been borrowed from the ſtage, where the different habits and geſtures of the actors, ſuitable to the ſeveral characters they ſuſtained, were by the Greeks called σχηματα, and by the Latins *figuræ:* And it is not unuſual with us to ſay of a perſon, both with reſpect to his dreſs and action, that he makes *a very bad,* or *a very graceful, figure.* And as language is the dreſs, as it were, of our thoughts, in which they appear and are repreſented to others; ſo any particular manner of ſpeaking, may in a large ſenſe of the word be called its *figure,* in which latitudes writers ſometimes uſe it. But rhetoricians have reſtrained the ſenſe of the word to ſuch forms of ſpeech as differ from the more common and ordinary ways of expreſſion; as the theatrical habits of actors, and their deporement on the ſtage, are different from their uſual garb and behaviour at other times. A *figure* therefore, in the ſenſe it is uſed by rhetoricians, is, *A mode of ſpeaking different from, and more beautiful and emphatical than, the ordinary and uſual way of expreſſing the ſame ſenſe.* Now as the habits and geſtures of our bodies are in a manner infinitely variable, ſo it is plain that the different forms of ſpeech are almoſt innumerable. But every alteration from the common manner ought not to be eſteemed a figure, nor deſerves that character. It muſt contain ſome beauty, or expreſs ſome paſſion, to merit a place among rhetorical figures, and be marked out for imitation.

The ſubject of *figures* ſeems to have been one of the laſt things which was brought into the art of oratory in order to complete it. Ariſtotle, who treats ſo accurately upon other parts, ſays very little of this. But the Greek writers who came after him have abundantly ſupplied that deficiency. It is to them we owe the chief obſervations, that have been made on this ſubject. They took notice of the ſeveral modes and turns of expreſſion, obſerved their force and beauty, and gave them particular names by which they might be known and diſtinguiſhed from each other. And indeed they have treated the matter with that minuteneſs and ſubtility, that Quintilian ſeems, not without reaſon, to think they have multiplied figures to an exceſs. But though it was ſo late before they were taken notice of, and introduced into the art of ſpeaking; yet the uſe of them in diſcourſe was doubtleſs very ancient. The author of Homer's life, which ſome have aſcribed to Plutrach, has ſhewn, by examples taken out of him, that there is ſcarce a figure mentioned by rhetoricians, but is to be met with in that moſt ancient poet. And, if we conſider the nature of ſpeech, we ſhall eaſily perceive that mankind muſt have been under a neceſſity very early to introduce the uſe of *tropes* for ſupplying the want of proper words to expreſs their ſimple ideas: ſo the like neceſſity muſt have put them upon the uſe of figures to repreſent their different paſſions. Tho' both of them were afterwards increaſed, and improved in ſuch a manner as to become the chief ornaments of language. The paſſions of men have been always the ſame; they are implanted in us by nature, and we are all taught to diſcover them by the ſame ways. When the mind is diſturbed, we ſhew it by our countenance, by our actions, and by our words. Fear, joy, anger, alter the countenance, and occaſion different emotions and geſtures of the whole body. And we know with what paſſion a man is affected, by hearing his words, though we do not ſee him. He does not expreſs himſelf as he uſually does at other times when cool and ſedate. Objects appear to him in a different view, and therefore he cannot but ſpeak of them in a different way. He interrogates, he exclaims, he admires, he appeals, he invokes, he threatens, he recalls his words, repeats them, and by many other different turns of expreſſion varies his ſpeech, no leſs than his countenance, from his common and ordinary manner. Now as nature ſeems to teach us by theſe figurative expreſſions how to repreſent the different commotions of our minds, hence ſome have thought fit to call figures *the language of the paſſions*. And as theſe are given us, among other wiſe ends, to excite us the better to provide for our preſervation and ſafety, this is done ſometimes by force of arms, and at other times by diſcourſe. And therefore Cicero very handſomely compares the conduct of an orator to the exerciſes of the palæſtra: in which, as each combatant endeavours not only to defend himſelf, and attack his adverſary, but likewiſe to do both with decency; ſo the principal weapons of an orator, as he repreſents them, are figures, which being no leſs the ornaments of language than images of our paſſions, anſwer all theſe purpoſes. Beſides, figures chiefly diſtinguiſh the different kinds of ſtyle, furniſh it with an agreeable variety, and often ſerve to repreſent things in a clear and forcible manner.

From this ſhort account of the nature of figures, the advantage of them to an orator is very evident. They are a ſort of natural eloquence, which every one falls into without attending to it, ſuitably to that temper of mind, with which he is affected himſelf, and is deſirous to affect others. In a cool and ſedate diſcourſe, ſuch figures as convey our ſentiments with the greateſt ſtrength and evidence are moſt proper. And there are others, which are ſuited to brighten and enliven more gay and ſprightly ſubjects. Others again are more peculiarly adapted to expreſs the diſorders and perturbations of the mind. To repeat the ſame thing again would many times be deemed a tautology and impertinent; but to do this when the mind is ruffled, is not only allowable, but the repetition renders it more ſtrong and affecting. So likewiſe to interrogate, exclaim, or admire, under the influence of a paſſion, impreſſes the hearers, and diſpoſes them to attention; whereas at another time perhaps ſuch ways of ſpeaking would ſcarce be conſiſtent with prudence. There is a natural ſympathy in mens minds, which diſpoſes them to receive impreſſions from thoſe with whom they converſe. Thus one gay and pleaſant companion gives a chearfulneſs and vivacity to a whole company; whereas on the contrary, one who is dull and flegmatic damps the ſpirits of all about him, and affects them with the ſame gloomy temper. Figures are peculiarly ſerviceable to an orator for anſwering theſe different intentions. And as he finds them in life, from thence he muſt copy them; as a painter does the features of the countenance, and the ſeveral parts of the body; figures being to the one what lines and colours are to the other. The deſign of Catiline to deſtroy the Roman ſtate and burn the city, is a ſtory well known. There was an army drawn together at a proper diſtance to favour the undertaking; and others were left in Rome, who had their parts aſſigned them for burning the city, and deſtroying thoſe who ſhould eſcape the flames. And in a word, every thing was ready for putting in execution this horrid and barbarous ſcheme. So that nothing retarded it but the taking off Cicero, who was then conſul, which was thought neceſſary to be done firſt. Cicero, upon information of the deſign againſt his life, finds means to prevent it, and the ſame day calls together the ſenate. And Catiline, who was a man of conſummate boldneſs, had the confidence to appear in that aſſembly. Upon their meeting, Cicero opens to them the whole affair of the conſpiracy, and the deſign againſt himſelf, in a moſt warm and pathetic harangue. In which he had two things in view; to raiſe the indignation of the ſenate againſt the conſpirators, and particularly againſt Catiline; and, either by terrifying or exaſperating him, to oblige him to leave the city. Now he does not begin this ſpeech in his uſual manner at other times, by addreſſing to his audience, beſpeaking their favour and attention, or letting them gradually into the deſign of what he was about to ſay; but as Catiline was preſent, he immediately falls upon him with vehemence, in the following manner: "How far, Catiline, will you abuſe our patience? How long will your fury inſult us? What bounds will you ſet to your unbridled rage? Does neither the night guard of the palace, nor the city watch, nor the peoples fear, nor the agreement of all good men, nor the meeting of the ſenate in this fortified place, nor the countenances and looks of this aſſembly, at all move you? Do not you perceive your deſigns are diſcovered, and that all who are preſent know of your conſpiracy? Who of us do you think is ignorant of what you did the laſt night, and the night before, where you was, who were with you, and what you reſolved on? O times, O manners! The ſenate knows this, the conſul ſees it; and yet this man lives!—lives? nay, comes into the ſenate, joins in the public counſels, obſerves and marks out each of us for deſtruction!" And in the ſame impetuous ſtrain he proceeds through his whole ſpeech, interſperſing a great variety of the like ſtrong and moving figures. And the diſcourſe had its deſired effect: for when Catiline ſtood up afterwards to make his defence, the whole ſenate was ſo inflamed, and their reſentments againſt him roſe ſo high, from what Cicero had ſaid, that they had not patience to hear him ſpeak; upon which he left both them and the city. Had Cicero, inſtead of venting his juſt indignation againſt the author of ſo barbarous and inhuman a deſign, in the manner he did, by figures ſuited to ſtrike the paſſions of his hearers; had he, inſtead of this, attempted to reaſon with him, and told the ſtory in a cold and lifeleſs manner, he would have expoſed himſelf to the contempt of Catiline; and by leaving the ſenate little or nothing moved at what he ſaid, prevented perhaps their coming to thoſe ſpeedy and vigorous reſolutions which were neceſſary at ſo critical a juncture. Let us ſuppoſe him to have expoſtulated with Catiline in much the ſame words as before, but thrown into a different form, and diveſted of thoſe pathetic figures. As thus: "Catiline, you have really abuſed our patience to a great degree. You have inſulted us with your furious proceedings a long while. You ſeem to have fixed no bounds to your unbridled rage. Neither the night-guard of the palace, nor the city-watch, nor the peoples fear, nor the agreement among good men, nor the calling together of the ſenate in this fortified place, nor the countenances and looks of this aſſembly, appear to move you in the leaſt. I aſſure you we are all of us appriſed of what you did the laſt night, and the night before, where you was, and who were with you, and what reſolutions you came to. Theſe are ſad times, the age is very degenerate; that the ſenate ſhould know all this, the conſul ſee it; and yet that this man ſhould live, come into the ſenate, hear all our debates, and mark us out to deſtroy us." You ſee the ſenſe is entirely the ſame, and the words too in a great meaſure; ſo that there is little more than an alteration in the form of them. And yet who does not perceive how flat and languid ſuch a way of talking muſt have appeared at that time? and how much it loſes of that ſpirit and energy, which ſhews itſelf in Cicero's manner of expreſſion? Had he delivered himſelf thus, it might indeed have made the ſenate look upon Catiline as an abandoned wretch, loſt to all virtue and goodneſs, and perhaps have moved ſome to pity him on that account; as we are eaſily induced to compaſſionate perſons in ſuch circumſtances, eſpecially when deſcended from noble and virtuous anceſtors, which was his caſe. But ſure it would have been ill ſuited to fire their minds with that generous regard for their country, and the neceſſary precautions for its ſecurity, which the circumſtances of the ſtate then required. Nor would Catiline have been at all deterred by it, but rather encouraged in the proſecution of his deſigns, from the little effect a ſpeech ſo managed muſt probably have had upon the minds of the ſenators. But Cicero knew very well, that the paſſions of mankind are the ſprings of action: that it is many times not ſufficient for an orator to convince their minds, by ſetting the truth in a clear light; but he muſt alſo raiſe their hopes, alarm their fears, inflame their anger, or excite ſome other ſuitable paſſion, before they will be brought to act with that zeal and fervour, which the caſe may require. And as he was admirably well ſkilled in this art of touching the paſſions, he ſeldom fails to fix upon the proper methods of doing it, and makes choice of ſuch figures and modes of ſpeaking as in the ſtrongeſt manner repreſent the emotions of his own mind. For every paſſion is not to be expreſſed by the ſame figures, any more than it is drawn by the ſame lines, or painted with the ſame colours. When Dido finds that Æneas is about to leave her, ſhe uſes all her arts to detain him. And as perſons in great diſtreſs are ſeldom at a loſs to expreſs their condition in the moſt affecting way; ſhe diſcovers her fear, anger, revenge, with the whole crowd of diſorders which then poſſeſſed her mind, in a variety of moving figures, ſuited to raiſe the counter paſſions in his breaſt, as is finely repreſented by Virgil in that artful ſpeech he has made for her, which we forbear to recite for no other reaſon but the length of it. But what particular figures are moſt accommodated to anſwer the ſeveral ends propoſed by them, will beſt appear when we come to treat of them ſeparately.

We ſhall therefore now proceed to lay down a few directions for the proper uſe of figures. And firſt they ſhould always be accommodated to the ſentiments, and riſe in proportion to the images deſigned to be conveyed by them. So far as they are founded in reaſon, they are ſuited to impreſs the mind; but where the language outſtrips the thought, though it may pleaſe the ear, and ſome weak perſons may be carried away with a pomp of words, yet an intelligent hearer will ſoon ſee through the thin and airy dreſs. It is the ſenſe which gives weight to the figure, as that by ſtriking the imagination awakens the mind, and excites it to act in conformity to reaſon. Again, in the uſe of pathetic figures, it is generally better to be nervous than copious, that the images, by their cloſer union, may impreſs the mind with greater force and energy; though in ſuch figures as are deſigned for ornament or illuſtration, a more diffuſive way of painting is ſometimes agreeable. But farther, the too frequent uſe of figures ought to be avoided. For what was obſerved in relation to tropes, is alſo true with reſpect to theſe; that a great number of them is apt to darken and obſcure the ſtyle. And beſides, Cicero's reflection in this caſe is very juſt, That "it is hard to ſay, what ſhould be the reaſon, that thoſe things, which moſt affect us with a ſenſible pleaſure, and at firſt ſight ſooneſt move us, do likewiſe ſooneſt cloy and ſatiate us." But that it is ſo, we find by common experience. Laſtly, figures ſhould be ſo interwoven in a diſcourſe, as not to render the ſtyle rough and uneven, ſometimes high and at other times low; now dry and jejune, then pompous and florid. In a word, they ſhould rather ſeem to ariſe from nature than art; to offer themſelves, than to be the effect of ſtudy; and to appear not like patches upon a face, but the agreeable beauty of a ſound and healthful complexion. But of this we ſhall have occaſion to ſpeak more at large hereafter, in treating upon the different kinds or characters of ſtyle.

As to the diviſion of figures, which is what remains to be conſidered, they are uſually divided into two ſorts, figures of words, and figures of ſentences. The difference between them conſiſts in this; that in the former, if you alter the words, or ſometimes only the ſituation of them, you deſtroy the figure; but in the latter the figure remains, whatever words are made uſe of, or in what manner ſoever the order of them is changed. Thus when the name of a perſon or thing is repeated, to intimate ſome known property or quality belonging thereto, it is a verbal figure called *ploce*. Cicero was a true patriot and hearty lover of his country. And therefore we ſhall uſe this figure in ſaying, that *at the time of Catiline's conſpiracy Cicero appeared like Cicero.* The ſenſe would remain the ſame, but the figure would be loſt, if we ſhould alter the words, and ſay, *at that time Cicero appeared like himſelf.* So when two or more ſentences, or members of a ſentence, end with the ſame word, it is called *epiſtrophe* ; as when we ſay, *To loſe all reliſh of life, is in effect to loſe life.* But if only the order of the words be changed in the latter clauſe thus, *To loſe all reliſh of life, is to loſe life in effect* ; the figure vaniſhes. And this is the nature of the verbal figures. But it is not ſo in figures of ſentences ; they continue the ſame, whatever alterations are made in the words. An orator ſometimes thinks it proper to change the form of his diſcourſe, and addreſs himſelf to his audience, or an abſent perſon, or elſe perhaps to introduce ſome other perſon as ſpeaking to them, whoſe words may be ſuppoſed to carry greater weight and authority with them than his own. The former of theſe is called *apoſtrophe*, and the latter *proſopopœia* or *imagery* ; which require no certain words, or order of expreſſion.

Art. I. Verbal Figures.

These may be diſtinguiſhed into three ſorts, as they conſiſt in a *deficiency* of words, a *redundancy*, or a *repetition*.

I. Of the firſt ſort are *ellipſis* and *aſyndeton*.

62 *Ellipſis*, is when one or more words are wanting in a ſentence, to complete the conſtruction, and fully expreſs the ſenſe. This figure is often uſed in proverbial ſpeeches : as when we ſay, *Many men, many minds* : that is, *have many minds* ; and, *The more danger, the more honour*, that is, *gains more honour*. But where more is intended by ſuch expreſſions than mere brevity, and eſpecially when they are the effect of ſome paſſion, the figure receives another name, and is called *apoſiopeſis*, which is placed among the figures of ſentences, where we ſhall conſider it.

63 *Aſyndeton*, is when the particles that connect the members of a ſentence one with another are left out, to repreſent either the celerity of an action, or the haſte and eagerneſs of the ſpeaker. Thus Cæſar expreſſes his ſpeedy conqueſt of Pharnaces : *I came, I ſaw, I conquered.* If he had inſerted the copulatives, and ſaid, *I came, and I ſaw, and I conquered* : it would have retarded the expreſſion, and not given ſo full and juſt an idea of the ſwiftneſs of the action. In the laſt article we took notice of the vehement and impetuous manner in which Cicero attacked Catiline in his firſt oration, where his deſign was to fire the minds of the ſenate againſt him, and oblige him to leave the city; both which points he gained by that ſpeech. The next day therefore, when Catiline was gone, he calls together the body of the citizens, and makes a ſpeech to them, which in a ſort of rapture or tranſport of mind he thus begins, by acquainting them with the departure of Catiline, *He is gone, departed, eſcaped, broke out* ; intimating at the ſame time both the exceſſive rage in which Catiline left Rome, and the great pleaſure with which he was himſelf affected on that account. This conciſe way of ſpeaking adds likewiſe a conſiderable emphaſis to an expreſſion, and by bringing the ſeveral parts of a thing nearer together affects the mind with greater force. Thus Cicero ſets Cato's character in a very ſtrong and beautiful light by the uſe of this figure. "Nature itſelf (ſays he) has made you a great and excellent man for integrity, gravity, temperance, magnaminity, juſtice, in a word, for all virtues."

II. The ſecond ſort of verbal figures is contrary to theſe, and conſiſts in a redundancy or multiplicity of words ; which are likewiſe two, *pleonaſmus* and *polyſyndeton*.

64 When we uſe more words than are neceſſary to expreſs a thing, it is called *pleonaſmus*. This is done ſometimes for greater emphaſis, as when we ſay, *Where in the world is he?* At other times it is deſigned to aſcertain the truth of what is ſaid : So the ſervant in Terence, when the truth of what he had related was called in queſtion, replies, *It is certainly ſo, I ſaw it with theſe very eyes.*

65 When the ſeveral parts of a ſentence are united by proper particles, it is called *polyſyndeton*. This adds a weight and gravity to an expreſſion, and makes what is ſaid to appear with an air of ſolemnity ; and by retarding the courſe of the ſentence, gives the mind an opportunity to conſider and reflect upon every part diſtinctly. We often meet with this figure in Demoſthenes, which very well ſuits with the gravity of his ſtyle. So he encourages the Athenians to proſecute the war againſt king Philip of Macedon, from this conſideration, that now "they had ſhips, and men, and money, and ſtores, and all other things which might contribute to the ſtrength of the city, in greater number and plenty than in former times. Every article here has its weight, and carries in it a proper motive to animate them to the war. And if you remove the copulatives, the ſentence will loſe much of its force.

III. The third kind of verbal figures conſiſt in a *repetition*. And either the ſame word in ſound or ſenſe, is repeated ; or one of a like ſound, or ſignification, or both.

Of the former ſort there are ten, called *antanaclaſis, ploce, epizeuxis, climax, anaphora, epiſtrophe, ſymploce, epanalepſis, anadiploſis*, and *epanodos*. The two firſt of theſe agree in ſound, but differ in ſenſe; the eight following agree in both.

66 When the ſame word in ſound but not in ſenſe is repeated, it is called *antanaclaſis*. This figure ſometimes carries a poignancy in it; and when it appears natural and eaſy, diſcovers a ready turn of thought. As when a ſon, to clear himſelf of ſuſpicion, aſſured his father *he did not wait for his death* ; his father replied, *But I deſire you would wait for it.* Here the word *wait* is taken in two different ſenſes. It is likewiſe uſed on ſerious occaſions, as in grave and moral precepts, which are apt to affect the mind with greater pleaſure when delivered in an agreeable dreſs. As this ; *Care for thoſe things in your youth, which in old age may free you from care* : Where the word *care* in the former place ſignifies to *provide*, and in the latter *anxiety of mind.* And even our Saviour himſelf once uſes this figure, when he ſays to one of his diſciples, who deſired to be diſmiſſed from attending him that he might go and bury his father ; *Follow me, and let the dead bury their dead* : Where dead in one place denotes a *natural death*, and in the other a *moral* or *ſpiritual death.*

67 Sometimes the name of ſome perſon or thing is repeated again, to denote ſome particular character or property deſigned to be expreſſed by it ; and then it is called *ploce*. Thus Cicero ſays, *Young Cato wants experience, but yet he is Cato* ; meaning he had the

ſteady temper of the family. And ſo in the proverbial expreſſion: *An ape is an ape, dreſs him ever ſo fine.*

68 When a word is repeated again with vehemence in the ſame ſenſe, it is called *epizeuxis*. This figure ſhews the earneſtneſs of the ſpeaker, and his great concern of mind about what he ſays; and therefore has a natural tendency to excite the attention of the audience. It is ſuited to expreſs anger, ſurprize, ſorrow, and ſeveral other paſſions. As when Cicero would expreſs his indignation againſt Anthony for having been the chief inſtrument in bringing on the civil war, he ſays to him: *You, you, Anthony, puſhed Cæſar upon the civil war.* And thus he tells Catiline in his firſt invective againſt him: *You live; and live, not to lay aſide, but to purſue, your wicked deſign.* And when our Saviour would expreſs his great concern and ſorrow for the wickedneſs of the Jews, he does it in this pathetic manner: *O Jeruſalem, Jeruſalem, who killeſt the prophets!*

69 *Climax*, is a beautiful kind of repetition, when the word, which ends the firſt member of a period, begins the ſecond, and ſo through each member, till the whole is finiſhed. There is a great deal of ſtrength as well as beauty in this figure, where the ſeveral ſteps riſe naturally, and are cloſely connected with each other. As in this example: *There is no enjoyment of property without government, no government without a magiſtrate, no magiſtrate without obedience, and no obedience where every one acts as he pleaſes.* But, as Quintilian obſerves, this figure lies ſo open, that it is apt to look too much like art; for which reaſon he adviſes not to uſe it often. To prevent this, therefore, orators ſometimes diſguiſe it, by not repeating the ſame word which ſtood in the former member, but ſome other equivalent to it. As in the following inſtance of Cicero for Milo: "Nor did he commit himſelf only to the people, but alſo to the ſenate; nor to the ſenate only, but likewiſe to the public forces; nor to theſe only, but alſo to his power with whom the ſenate had entruſted the whole commonwealth."

70 When ſeveral ſentences, or members of a ſentence, begin with the ſame word, it is called *anaphora*. This is a lively and elegant figure, and ſerves very much to engage the attention. For by the freqnent return of the ſame word the mind of the hearer is held in an agreeable ſuſpence, till the whole is finiſhed. "You do nothing, (ſays Cicero to Catiline,) you attempt nothing, you think nothing, but what I not only hear, but alſo ſee, and plainly perceive." It is frequently uſed by way of queſtion; which renders it not only beautiful, but likewiſe ſtrong and nervous. As at the beginning of the ſame ſpeech: "Does neither the night-guard of the palace, nor the city-watch, nor the peoples fear, nor the agreement of all good men, nor the meeting of the ſenate in this fortified place, nor the countenances and looks of this aſſembly, at all move you?" And in another of his orations: "What is ſo popular as peace, which ſeems to afford a pleaſure, not only to beings endowed with ſenſe, but even to inanimate nature? What is ſo popular as liberty, which even beaſts as well as men ſeem to covet and prefer above all things? What is ſo popular as eaſe and leiſure, for the enjoyment of which you and your anceſtors have undergone the greateſt labours?"

71 *Epiſtrophe*, is contrary to the former, and makes the repetition at the end of each member or ſentence. As thus: *Since concord was loſt, friendſhip was loſt, fidelity was loſt, liberty was loſt, all was loſt.* And Cicero, in the charge which he brings againſt Mark Anthony before the ſenate, makes uſe of this figure, when he ſays, "Do you lament the deſtruction of three Roman armies? The author of that deſtruction was Anthony. Do you bewail the loſs of moſt eminent citizens? They have been taken from you by Anthony. Is the authority of this order weakened? It is weakened by Anthony."

72 *Symploce* takes in both theſe laſt figures. As in that of Cicero: "You would pardon and acquit him, whom the ſenate hath condemned, whom the people of Rome have condemned; whom all mankind have condemned." Here the ſeveral members both begin and end with the ſame word. We have a beautiful inſtance of it in St Paul, when he ſays: "Are they Hebrews? ſo am I. Are they Iſraelites? ſo am I. Are they the ſeed of Abraham? ſo am I."

73 When a ſentence concludes with the word with which it began, it is called *epanalepſis*. As in that expreſſion of Plautus, "Virtue contains all things, he wants no good thing who has virtue." The figure is the ſame, but the principle not ſo honeſt, in the advice which we find given by the miſer in Horace, when he ſays, "Get money if you can, honeſtly; but however, get money." This figure adds a force to an expreſſion, when the principal thing deſigned to be conveyed is thus repeated, by leaving it laſt upon the mind. And it heightens the beauty of it, when the ſentence has an agreeable turn ariſing from two oppoſite parts. As in Cicero's compliment to Cæſar: "We have ſeen your victory terminated by the war; your drawn ſword in the city we have not ſeen." Hermogenes calls this a *circle*, becauſe the ſentence returns again to the ſame word, as that geometrical figure is formed by the orbicular motion of a line to the ſame point.

74 When the following ſentence begins with the ſame word with which the former concluded, it is termed *anadiploſis*. As in the following inſtance: *Let us think no price too great for truth; truth cannot be bought too dear.* So in that paſſage of St John: *He came to his own, and his own received him not.* This figure generally ſuits beſt with grave and ſolemn diſcourſes.

75 *Epanodos*, is the inverſion of a ſentence, or repeating it backwards, ſo that it takes in the two laſt figures; for it both begins and ends with the ſame word, and the ſame word is likewiſe repeated in the middle. This turn of expreſſion has a beauty in it, and ſhews a readineſs of thought. We have the following example of it in Minutius Felix, where he is expoſing the folly of the Egyptian ſuperſtition. "Iſis (ſays he) with Cynocephalus and her prieſts, laments, bemoans, and ſeeks her loſt ſon; her attendants beat their breaſts, and imitate the grief of the unhappy mother; in a little time the ſon is found, upon which they all rejoice. Nor do they ceaſe every year to loſe what they find, or to find what they loſe. And is it not ridi-

diculous to lament what you worſhip, or to worſhip what you lament?" It ſerves likewiſe to illuſtrate and enforce the ſenſe, by ſetting it in two oppoſite views. As in that expreſſion of the prophet: "Wo unto them who call good evil, and evil good; who put darkneſs for light, and light for darkneſs!"

Thoſe figures which conſiſt in a repetition of words of a like ſound or ſignification, or both, are four; *paronomaſia*, *homoioptoton*, *ſynonymia*, and *derivatio*; the two firſt of which reſpect words that are ſimilar in ſound only, the third in ſenſe, and the laſt in both.

76 When two words very near in ſound, but different in ſenſe, reſpect each other in the ſame ſentence, it is called *paronomaſia*. As when we ſay, *After a feaſt comes a faſt*; and, *A friend in need is a friend indeed*. We uſually call it a *pun*; which when new, and appoſitely uſed, paſſes for wit, and ſerves to enliven converſation. Nor is it wholly to be excluded from grave and ſerious diſcourſes: for a witty jeſt has many times had a better effect than a ſolid argument, and prevailed with thoſe who could not be moved by cloſe reaſoning. And therefore Cicero and the beſt ſpeakers have ſometimes recourſe to it upon weighty and ſolemn occaſions, as will be ſhewn hereafter in its proper place.

77 When the ſeveral parts of a ſentence end with the ſame caſe, or tenſe of a like ſound, this alſo is conſidered as a figure, and named *homoioptoton*. As thus: *No marvel though wiſdom complains that ſhe is either wilfully deſpiſed, or careleſsly neglected; either openly ſcorned, or ſecretly abhorred.* This figure is eſteemed moſt beautiful when the parts are all of the ſame length, or pretty near it; as it adds to the harmony of the period, and renders the cadency of the ſeveral members more muſical from the juſt proportion between them. The Greek rhetoricians were much addicted to this figure, and Iſocrates is particularly celebrated for it. But ſome of the beſt orators ſeem to have induſtriouſly avoided it, as carrying in it too much the appearance of art. And it is remarkable, that this figure appears nowhere ſo much in all the works of Demoſthenes, as in an oration, which he did not ſpeak himſelf, but wrote for his friend Diodorus, a man of that taſte, who was to pronounce it as his own.

78 The next figure above-mentioned is *ſynonymia*. Now ſtrictly ſpeaking, ſynonymous words are thoſe which have exactly the ſame ſenſe. But there being few ſuch, the uſe of the term is ſo far extended as to comprehend words of a near affinity in their ſignification, which in diſcourſe are frequently put for one another. So, *to deſire*, and *intreat*, are ſometimes uſed as equivalent terms; whereas *to deſire* is no more than to wiſh for a thing, and *to intreat* is to expreſs that inclination in words. In like manner, *eſteem* and *honour*, are often taken for ſynonymous words, though they have not preciſely the ſame ſenſe, but one is the uſual conſequence of the other; for eſteem is the good opinion we entertain of a perſon in our mind, and honour the outward expreſſion of that opinion. When two or more ſuch words come together, they conſtitute this figure. As when Cicero ſpeaking of Piſo ſays, "His whole countenance, which is the tacit language of the mind, has drawn men into a miſtake, and deceived, cheated, impoſed on thoſe who did not know him." This figure ſometimes adds force to an expreſſion, by enlivening the idea; and it often promotes the harmony and juſt cadency of a ſentence, which otherwiſe would drop too ſoon, and diſappoint the ear.

79 When ſuch words as ſpring from the ſame root, as *juſtice*, *juſt*, *injuſtice*, *unjuſt*, and the like, come together in the ſame ſentence, they make the figure called *derivatio*. Cicero obſerving the vanity of the philoſophers, who affected praiſe at the ſame time that they decried it, uſes this figure, when he ſays of them, "The philoſophers ſet their names to thoſe very books which they write for the contempt of glory; and are deſirous to be honoured and applauded, even for what they ſay in contempt of honour and applauſe." This figure receives an additional beauty when repeated, eſpecially in two oppoſite members; as, *He wiſhed rather to die a preſent death, than to live a miſerable life.*

Art. II. Figures *of* Sentences.

Of theſe, ſome are principally adapted for reaſoning, and others to move the paſſions.

I. *Thoſe ſuited for proof.* Which are ſix: *Prolepſis*, *hypobole*, *anacoinoſis*, *epitrope*, *parabole*, and *antitheſis*.

80 *Prolepſis*, or *anticipation*, is ſo called, when the orator firſt ſtarts an objection, which he foreſees may be made either againſt his conduct or cauſe, and then anſwers it. Its uſe is to foreſtall an adverſary, and prevent his exceptions, which cannot afterwards be introduced with ſo good a grace. Though it has likewiſe a farther advantage, as it ſerves to conciliate the audience, while the ſpeaker appears deſirous to repreſent matters fairly, and not to conceal any objection which may be made againſt him. The occaſions of this figure are various; and the manner of introducing it very different. Sometimes the orator thinks it neceſſary to begin with it, in order to juſtify his conduct, and remove any exceptions which may be made againſt his deſign. Cicero for ſeveral years together, after he firſt began to plead, had always been for the defendant in criminal caſes. And therefore, when he was prevailed with to undertake the accuſation of Verres, he begins his oration with this apology for himſelf: "If any one preſent ſhould wonder, that when for ſeveral years paſt I have ſo conducted myſelf as to defend many and accuſe none, I now on a ſudden alter my cuſtom, and undertake an accuſation; when he ſhall have heard the occaſion and reaſon of my deſign, he will both approve of it, and think no perſon ſo proper to manage this affair as myſelf." And then he proceeds to give an account of the reaſons which moved him to engage in it. At other times the objection is admitted as an exception to what has been ſaid, but not ſo as to affect it in general. Thus, when Cicero has repreſented the advantages of literature and the polite arts, he ſtarts this objection to what himſelf had ſaid, "But ſome one will aſk, whether thoſe great men, the memory of whoſe glorious actions is delivered down to poſterity, were acquainted with that ſort of learning I ſo applaud?" To which he replies, "Indeed this can ſcarce be ſaid of them all. However, the anſwer is eaſy. I have known ſeveral perſons of excellent abilities, who, without learning, by the force of an extraordinary genius

nius, have been men of great virtue and ſolidity. Nay I will add, that nature without learning, has oftener produced theſe qualifications, than learning without a genius. But yet it muſt ſtill be owned, that where both theſe meet, they form ſomething very excellent and ſingular.” Again, at other times, the orator artfully repreſents the objection as ſomething conſiderable and important, to give the greater weight to his anſwer when he has confuted it. Cicero, in his celebrated oration for the Manilian law, could not omit to take notice, that Lucullus had already gained ſeveral very conſiderable advantages over Mithridates. And therefore, having before deſcribed the war as very great and dangerous, apprehending theſe two accounts might appear ſomewhat inconſiſtent, and be liable to an objection; he puts it thus artfully himſelf: “ But now, after what I have ſaid of Lucullus, it may probably be aſked, How then can the war be ſo great? Be pleaſed to hear, for there ſeems to be very juſt reaſon for this queſtion.” And then he proceeds to ſhew, from the power of king Mithridates at that time, his great abilities, long experience in military affairs, and freſh alliances, that the war was yet very great and dangerous. But ſometimes, when the orator is ſenſible that what he has advanced lies open to an objection, he omits to make it in expreſs terms; and yet proceeds to vindicate what he had ſaid, as if it had been made. Thus, when Cicero had charged Verres with having plundered the inhabitants of Sicily of all their plate, jewels, and other valuable moveables, which he thought worth while to carry away; as the audience might imagine this to be ſcarce credible, he takes it for granted they thought ſo; and therefore immediately adds, “ As ſtrange as this is, I affirm it poſitively, without any intention to aggravate the crime.” And ſo he goes on to the proof of his aſſertion. But this figure is likewiſe made uſe of to guard againſt ſome objection, which the ſpeaker apprehends may be made againſt what he deſigns to ſay. And thus Cicero uſes it in his oration for Sextius. “ My province, (ſays he) as I ſpeak laſt, ſeems to call for affection to my friend, rather than his defence; complaint, rather than eloquence; expreſſions of grief, rather than art. And therefore, if I ſhall expreſs myſelf with more warmth, or greater freedom, than thoſe who have ſpoke before me, I hope you will grant me all that liberty of ſpeech which you judge reaſonable to be allowed to an affectionate ſorrow, and juſt reſentment.” This figure requires great prudence and diſcretion in the management of it. The ſpeaker muſt conſider well the temper, bias, and other circumſtances of his hearers, in order to form a right judgment what parts of his diſcourſe may be moſt liable to exception. For to object ſuch things, which the hearers would never have thought of themſelves, is to give himſelf a needleſs trouble; and to ſtart ſuch difficulties, which he cannot afterwards fairly remove, will expoſe both himſelf and his cauſe. But as nothing gives an audience greater pleaſure and ſatisfaction, than to have their ſcruples fully anſwered as they riſe in their thoughts; ſo on the contrary, be a diſcourſe otherwiſe ever ſo entertaining and agreeable, if there be any doubt left upon the minds of the hearers, it gives them a pain that continues with them till it be removed.

81 The figure *hypobole* or *ſubjection*, is not much unlike the former; and is, when ſeveral things are mentioned that ſeem to make for the contrary ſide, and each of them refuted in order. It conſiſts of three parts, when complete; a propoſition, an enumeration of particulars with their anſwers, and a concluſion. Thus, Cicero upon his return from baniſhment, vindicates his conduct in withdrawing ſo quietly, and not oppoſing the faction that ejected him. “ My departure (ſays he) is objected to me, which charge I cannot anſwer without commending myſelf. For what muſt I ſay? That I fled from a conſciouſneſs of guilt? But what is charged upon me as a crime, was ſo far from being a fault, that it is the moſt glorious action ſince the memory of man, (he means his puniſhing the aſſociates of Cataline.) That I feared being called to an account by the people? That was never talked of; and if it had been done, I ſhould have come off with double honour. That I wanted the ſupport of good and honeſt men? That is falſe. That I was afraid of death? That is a calumny. I muſt therefore ſay, what I would not, unleſs compelled to it, that I withdrew to preſerve the city.” When the objections are put by way of queſtion, as in the example here given, they add a briſkneſs and poignancy to the figure. All the parts of it are not conſtantly expreſſed. For thus Cicero in his defence of Plancius introduces his adverſary objecting, and himſelf anſwering, “ The people judged ill, but they did judge; they ſhould not have done it, but they had a power; I cannot ſubmit to it, but many very great and wiſe men have.” Both the propoſition and concluſion are here omitted.

The next figure in order is *anacoinoſis*, or *communication*; by which the ſpeaker deliberates either with the judges, the hearers, or the adverſary himſelf. Thus Cicero addreſſes the judges in his accuſation of Verres: “ Now I deſire your opinion, what you think I ought to do. And I know your advice will be, though you do not declare it, what appears to me neceſſary to be done.” In another place we find him reaſoning in this manner with the adverſe party: “ What could you have done in ſuch a caſe, and at ſuch a time; when to have ſat ſtill, or withdrawn, would have been cowardice? When the wickedneſs and fury of Saturninus the tribune had called you into the capitol; and the conſuls, to defend the ſafety and liberty of your country; whoſe authority, whoſe voice, which party would you have followed, and whoſe command would you have choſen to obey?” This figure carries in it an air of modeſty and condeſcenſion, when the ſpeaker ſeems unwilling to determine in his own cauſe, but refers it to the opinion of others. It likewiſe ſhews a perſuaſion of the equity of his cauſe, that he can leave it to their arbitration; and ſerves very much to conciliate their minds, while he joins them, as it were, with himſelf, and makes them of his party. And when the appeal is made to the adverſe party, it is of conſiderable advantage, either to extort a confeſſion, or at leaſt to ſilence him. And therefore the ſacred writers ſometimes very beautifully introduce God himſelf thus expoſtulating with mankind; as the prophet Malachi, *A ſon honoureth his father, and a ſervant his maſter. If then I be a father, where is mine honour? and if I be a maſter, where is my fear?* 82

83 Another figure that comes under this head, is

epitrope or *conceſſion;* which grants one thing, to obtain another more advantageous. It is either real or feigned; and either the whole of a thing, or a part only, is granted. We ſhall conſider each of theſe ſeparately, and illuſtrate them with proper examples. Nothing more confounds an adverſary, than to grant him his whole argument; and at the ſame time either to ſhew that it is nothing to the purpoſe, or to offer ſomething elſe which may invalidate it. *I allow*, ſays the claimant by will againſt the heir at law, *that no body was more nearly related to the deceaſed than you; that he was under ſome obligations to you; that you were in the army together: but what is all this to the will?* And thus Cicero in his defence of Ligarius, who was accuſed by Tubero for having joined with Pompey in the civil war between him and Cæſar: "You have, Tubero, what an accuſer would moſt deſire, the accuſed perſon confeſſing the charge; but ſo as to affirm, that he was of the ſame party with you and your excellent father. Therefore own firſt that it was a crime in yourſelf, before you charge it as ſuch upon Ligarius." Sometimes the orator gives up ſome particular point that would well admit of a diſpute, to gain ſomething more conſiderable, which he thinks cannot fairly be denied him. In the affair of Roſcius, where the proof depended upon circumſtances, Cicero, who defended him, inquires what reaſon could be alleged for his committing ſo black a crime, as to kill his father. And after he has ſhewn there was no probable reaſon to be aſſigned for it, he adds, "Well, ſince you can offer no reaſon, although this might be ſufficient for me, yet I will recede from my right; and upon the aſſurance I have of his innocence, I will grant you in this cauſe what I would not in another. I do not therefore inſiſt upon your telling me why he killed his father, but aſk how he did it?" This appearance of candour and ingenuity in ſuch conceſſions removes the ſuſpicion of art, and gives greater credit to what is denied. We have an example of a feigned or ironical conceſſion, in Cicero's defence of Flaccus; where, interceding for him on the account of his former good ſervices in the time of Cataline's conſpiracy, he ſays in a way of irony, If ſuch things are to be overlooked, "let us appeaſe the ghoſts of Lentulus and Cethegus; let us recall thoſe who are in exile; and let us be puniſhed for our too great affection and love for our country." By this artful inſinuation the orator, after he has uſed all his arguments to perſuade his hearers, does as it were ſet them at liberty, and leave them to their own election; it being the nature of man to adhere more ſtedfaſtly to what is not violently impoſed, but referred to their own free and deliberative choice. And to theſe feigned conceſſions may be referred ſuch ways of reaſoning, by which the orator both juſtifies a charge brought againſt him upon the ſuppoſition of its being true, and alſo proves that the charge itſelf is falſe. Thus Cicero, in his defence of Milo, repreſents the taking off Clodius, with which Milo was accuſed, as a glorious action; after he has ſhewn that Milo's ſervants did it without the knowledge of their maſter.

84 *Parabole* or *ſimilitude*, illuſtrates a thing by comparing it with ſome other, to which it bears a reſemblance. Similitudes are indeed generally but weak arguments, though often beautiful and fine ornaments. And where the deſign of them is not ſo much to prove what is doubtful, as to ſet things in a clear and agreeable light, they come properly under the notion of figures. They are of two ſorts; ſimple and compound. Thoſe are called *ſimple*, in which one thing only is likened or compared to another, in this manner: *As ſwallows appear in ſummer, but in winter retreat; ſo falſe friends ſhow themſelves in proſperity, but all fly away when adverſity approaches.* Compound ſimilitudes are ſuch, wherein one thing is likened or compared to ſeveral others; as thus: *What light is to the world, phyſic to the ſick, water to the thirſty, and reſt to the weary; that is knowledge to the mind.* The more exact the agreement is between the things thus compared, they give the greater beauty and grace to the figure.

Antitheſis or *oppoſition*, by which things contrary or different are compared, to render them more evident. Thus Cicero ſays, "The Roman people hate private luxury, but love public grandeur." This is a very florid figure; and ſuited no leſs for amplification than proof. As in the following inſtance of Cicero, where, ſpeaking of Pompey, he ſays, "He waged more wars than others had read; conquered more provinces than others had governed; and had been trained up from his youth to the art of war, not by the precepts of others, but by his own commands; not by miſcarriages in the field, but by victories; not by campaigns, but triumphs." It is eſteemed a beauty in this figure when any of the members are inverted, which ſome call *antimetatheſis*. As where Cicero, oppoſing the conduct of Verres when governor of Sicily, to that of Marcellus who took Syracuſe the capital city of that iſland, ſays, "Compare this peace with that war, the arrival of this governor with the victory of that general, his profligate troops with the invincible army of the other, the luxury of the former with the temperance of the latter; you will ſay, that Syracuſe was founded by him who took it, and taken by him who held it when founded." To this figure may alſo be referred *oxymoron*, or *ſeeming contradiction;* that is, when the parts of a ſentence diſagree in ſound, but are conſiſtent in ſenſe. As when Ovid ſays of Althea, that *ſhe was impiouſly pious.* And ſo Cato uſed to ſay of Scipio Africanus, that "he was never leſs at leiſure, than when he was at leiſure; nor leſs alone, than when alone:" By which he meant, as Cicero tells us, that "Scipio was wont to think of buſineſs in his retirement, and in his ſolitude to converſe with himſelf." This is a ſtrong and bold figure, which awakens the mind, and affords it an agreeable pleaſure to find upon reflection, that what at firſt ſeemed contradictory, is not only conſiſtent with good ſenſe, but very beautiful. 85

II. *Thoſe ſuited to move the paſſions.* Which are 13; namely, *epanorthoſis*, *paralepſis*, *parrheſia*, *aparithmeſis*, *exergaſia*, *hypotypoſis*, *aporia*, *poſiopeſis*, *eroteſis*, *ecphoneſis*, *epiphonema*, *apoſtrophe*, and *proſopeia*.

86 *Epanorthoſis*, or *correction*, is a figure, by which the ſpeaker either recalls or amends what he had laſt ſaid. It is uſed different ways. For ſometimes one or more words are recalled by him, and others ſubjoined in their room; at other times, without recalling what has been ſaid, ſomething elſe is ſubſtituted as more ſuitable. This is a very extenſive figure, and

made uſe of in addreſſing to different paſſions. We have an inſtance of it in Terence's *Self-tormentor*, where the old man, whoſe extraordinary concern for the abſence of his ſon gave occaſion to the name of the play, thus bewails his condition to his neighbour, "I have an only ſon, Chremes. Alas! did I ſay that I have? I had indeed; but it is now uncertain whether I have or not." Here, to aggravate his misfortune, he recalls a pleaſing word, and ſubſtitutes another more affecting in its place. And Cicero, in his defence of Milo, ſpeaking to the judges concerning Clodius, ſays, "Are you only ignorant, what laws, if they may be called laws, and not rather torches and plagues of the ſtate, he was about to impoſe and force upon us?" Again, in his defence of Plancius he ſays, "What greater blow could thoſe judges, if they are to be called judges, and not parricides of their country, have given to the ſtate, than when they baniſhed him, who, when prætor, freed the republic from a neighbouring war, and when conſul, from a civil one?" He is ſpeaking there of Opimius. But in commending the moderation of Lucius Mummius, who did not enrich himſelf, but his country, by demoliſhing the wealthy city of Corinth, he thus recalls his whole expreſſion, and by giving it a new turn heightens the compliment he deſigned him: "He choſe rather (ſays he) to adorn Italy, than his own houſe; though by adorning Italy, his houſe ſeems to have received the greateſt ornament." And ſometimes the correction is made by ſubſtituting ſomething contrary to what had been ſaid before; as in the following paſſage of Cicero: "Cæſar, (meaning Auguſtus) though but a youth, by an incredible and ſurpriſing reſolution and courage, when Antony was moſt enraged, and we dreaded his cruel and pernicious return from Brunduſium, at a time when we neither aſked, nor expected, nor deſired it, (becauſe it was thought impoſſible), raiſed a very powerful army of invincible veterans; to effect which, he threw away his whole eſtate: Tho' I have uſed an improper word; for he did not throw it away, but employed it for the ſafety of the government." At other times, as has been ſaid, the correction is made by adding a more ſuitable word, without any repetition of the former. Thus Cicero, after he has inveighed againſt the crimes of Verres, breaks out into this pathetic exclamation; *O the clemency, or rather wonder ful andſingular patience, of the Roman people!* He did not think the word *clemency* ſtrong enough, and therefore adds *patience*, as better anſwering his deſign. The ſudden and unexpected turn of this figure gives a ſurprize to the mind, and by that means renders it the more pathetic.

87 *Paralepſis*, or omiſſion, is another of theſe figures, when the ſpeaker pretends to omit, or paſs by, what at the ſame time he declares. It is uſed either in praiſe or diſpraiſe. Thus Cicero, in his defence of Sextius, introduces his character in this manner, with a deſign to recommend him to the favour of the court: "I might ſay many things of his liberality, kindneſs to his domeſtics, his command in the army, and moderation during his office in the province: but the honour of the ſtate preſents itſelf to my view; and calling me to it, adviſes me to omit theſe leſſer matters." But in his oration to the ſenate againſt Rullus the tribune, who had propoſed a law to ſell the public lands, he makes uſe of this figure to repreſent the pernicious effects of ſuch a law, particularly with reſpect to the lands in Italy. "I do not complain (ſays he) of the diminution of our revenues, and the woful effects of this loſs and damage. I omit what may give every one occaſion for a very grievous and juſt complaint, that we could not preſerve the principal eſtate of the public, the fineſt poſſeſſion of the Roman people, the fund of our proviſions, the granary of our wants, a revenue entruſted with the ſtate; but that we muſt give up thoſe lands to Rullus, which, after the power of Sylla, and the largeſſes of the Gracchi, are yet left us. I do not ſay, this is now the only revenue of the ſtate, which continues when others ceaſe, is an ornament in peace, fails us not in war, ſupports the army, and does not fear an enemy. I paſs over all theſe things, and reſerve them for my diſcourſe to the people, and only ſpeak at preſent of the danger of our peace and liberties." His view here was to raiſe the indignation of the ſenate againſt Rullus, and excite them to oppoſe the law. There is a beautiful inſtance of this figure in St Paul's epiſtle to Philemon, where, after he has earneſtly intreated him to receive again Oneſimus his ſervant, who had run from him, and promiſed that if he had wronged him, or owed him any thing, he would repay it, he adds, *That I may not ſay, you owe even yourſelf to me.* Nothing could be a ſtronger motive to ſoften his diſpleaſure againſt his ſervant, from a ſenſe of gratitude to the apoſtle. Hermogenes has obſerved, that the deſign of this figure is to poſſeſs the minds of the audience with more than the words expreſs, and that it is principally made uſe of on three occaſions: either when things are ſmall, but yet neceſſary to be mentioned; or well known, and need not be enlarged on; or ungrateful, and therefore ſhould be introduced with caution, and not ſet in too ſtrong a light.

88 The next figure abovementioned was *Parrheſia*, or reprehenſion: Not that whenever a perſon admoniſhes or reproves another, it is to be eſteemed a figure; but when it is done with art and addreſs, and in ſuch circumſtances as render it difficult not to diſpleaſe. The The orator therefore ſometimes prepares his hearers for this by commending them firſt, urging the neceſſity of it, repreſenting his great concern for them as his motive, or joining himſelf with them. Thus Cicero charges the ſenate with the death of Servius Sulpicius, for ſending him to Mark Antony under a very ill ſtate of health. And his deſign in it was to bring them more readily into a motion he was about to make, that both a ſtatue and a ſepulchral monument might be erected to his memory at the public expence. "You (ſays he), it is a very ſevere expreſſion, but I cannot help ſaying it; you, I ſay, have deprived Servius Sulpicius of his life. It was not from cruelty indeed, (for what is there with which this aſſembly is leſs chargeable?) but when his diſtemper pleaded his excuſe more than his words, from the hopes you conceived, that there was nothing which his authority and wiſdom might not be able to effect, you vehemently oppoſed his excuſe, and obliged him, who always had the greateſt regard for your commands, to recede from his reſolution." Sometimes, indeed, the orator aſſumes an air of reproof, with a

view only to paſs a compliment with a better grace. As Cicero in his addreſs to Cæſar, when he ſays, "I hear that excellent and wiſe ſaying from you with concern, That you have lived long enough, either for the purpoſes of nature, or glory: for nature perhaps, if you think ſo; and, if you pleaſe, for glory; but, what is principally to be regarded, not for your country." It adds both a beauty and force to this figure, when it is expreſſed in a way of compariſon. As in the following inſtance of Cicero: "But ſince my diſcourſe leads me to this, conſider how you ought to be affected for the dignity and glory of your empire. Your anceſtors often engaged in war to redreſs the injuries of their merchants or ſailors: how ought you then to reſent it, that ſo many thouſand Roman citizens were murdered by one meſſage, and at one time? Your forefathers deſtroyed Corinth, the principal city in Greece, for the haughty treatment of their ambaſſadors; and will you ſuffer that king to go unpuniſhed who has put to death a Roman legate, of conſular dignity, in the moſt ignominious as well as moſt cruel manner? See, leſt, as it was their honour to leave you the glory of ſo great an empire, it ſhould prove your diſgrace not to be able to maintain and defend what you have received from them." By this figure an addreſs is made to the more tender paſſions, modeſty, ſhame, and emulation, the attendants of an ingenuous temper, which is ſooneſt touched, and moſt affected, by a juſt reproof.

89 Another of theſe pathetic figures is *Aparithmeſis*, or *enumeration*, when that which might be expreſſed in general by a few words, is branched out into ſeveral particulars, to enlarge the idea, and render it the more affecting. Cicero in pleading for the Manilian law, where his deſign is to conciliate the love and eſteem of the people to Pompey, thus enlarges upon his character: "Now, what language can equal the virtue of Cneius Pompey? What can be ſaid either worthy of him, or new to you, or which every one has not heard? For thoſe are not the only virtues of a general which are commonly thought ſo; labour in affairs, courage in dangers, induſtry in acting, diſpatch in performing, deſign in contriving; which are greater in him than in all other generals we have ever ſeen or heard of." And ſo likewiſe, when he endeavours to diſpoſſeſs Pompey of the apprehenſion that Milo deſigned to aſſaſſinate him: "If (ſays he) you fear Milo; if you imagine that either formerly, or at preſent, any ill deſign has been formed by him againſt your life; if the ſoldiers raiſed through Italy, (as ſome of your officers give out), if theſe arms, if theſe cohorts in the Capitol, if the centries, if the watch, if the guards which defend your perſon and houſe, are armed to prevent any attempt of Milo, and all of them appointed, prepared, and ſtationed on his account; he muſt be thought a perſon of great power, and incredible reſolution, above the reach and capacity of a ſingle man, that the moſt conſummate general, and the whole republic are in arms againſt him only. But who does not perceive, that all the diſordered and ſinking parts of the ſtate are committed to you, to rectify and ſupport them by theſe forces?" This might have been ſaid in a few words, that ſuch vaſt preparations could never be intended for ſo low a purpoſe. But the orator's view was to expoſe that groundleſs report, and ſhame it out of countenance. And ſoon after he endeavours to raiſe compaſſion for Milo under thoſe prejudices, by the ſame figure: "See how various and changeable is the ſtate of human life, how unſteady and voluble is fortune, what infidelity in friends, what diſguiſes ſuited to the times, what flights, what fears, even of the neareſt acquaintance, at the approach of dangers." Had no addreſs to the paſſions been deſigned here, fewer of theſe reflections might have been ſufficient. The uſe of this figure in amplification is very evident from the nature of it, which conſiſts in unfolding of things, and by that means enlarging the conception of them.

90 *Exergaſia*, or *expoſition*, has an affinity with the former figure: but it differs from it in this, that it conſiſts of ſeveral equivalent expreſſions, or nearly ſuch, in order to repreſent the ſame thing in a ſtronger manner; whereas the other enlarges the idea by an enumeration of different particulars. So that this figure has a near relation to ſynonymia, of which we have treated before under *Verbal figures*. We have an inſtance of it in Cicero's defence of Sextius, where he ſays, "Thoſe who at any time have incited the populace to ſedition, or blinded the minds of the ignorant by corruption, or traduced brave and excellent men, and ſuch as deſerved well of the public, have with us always been eſteemed vain, bold, bad, and pernicious citizens. But thoſe who repreſſed the attempts and endeavours of ſuch as, by their authority, integrity, conſtancy, reſolution, and prudence, withſtood their inſolence, have been always accounted men of ſolidity, the chiefs, the leaders, and ſupporters of our dignity and government." Nothing more is intended by this paſſage, but to ſet the oppoſite characters of factious perſons and true patriots in the ſtrongeſt light, with a view to recommend the one, and create a juſt hatred and deteſtation of the other. So elſewhere he repreſents the juſtice of ſelf-defence in no leſs different terms: "If reaſon (ſays he) preſcribes this to the learned, and neceſſity to barbarians, cuſtom to nations, and nature itſelf to brutes, always to ward off all manner of violence, by all poſſible ways, from their body, from their head, from their life; you cannot judge this to be a criminal and wicked action, without judging at the ſame time that all perſons who fall among robbers and aſſaſſins muſt either periſh by their weapons, or your ſentence."— He is addreſſing here to the judges in favour of Milo. The warmth and vehemence of the ſpeaker often runs him into this figure, when he is affected with his ſubject, and thinks no words, no expreſſions, forcible enough to convey his ſentiments; and therefore repeats one after another, as his fancy ſuggeſts them. This flow of expreſſion, under the conduct of a good judgment, is often attended with advantage; as it warms the hearers, and impreſſes their minds, excites their paſſions, and helps them to ſee things in a ſtronger light.

91 *Hypotypoſis*, or *imagery*, is a deſcription of things painted in ſuch ſtrong and bright colours, as may help the imagination of the hearers to conceive of them rather as preſent to their view, than deſcribed in words. It is peculiarly ſuited for drawing characters; and often affords the fineſt ornaments in poetry and hiſtory, as well as oratory. Nor is it leſs moving,

but ſuited to ſtrike different paſſions, according to the nature of the ſubject, and artful management of the ſpeaker. Cicero has thus drawn the picture of Catiline, conſiſting of an unaccountable mixture of contrary qualities. “He had (ſays he) the appearance of the greateſt virtues: he made uſe of many ill men to carry on his deſigns, and pretended to be in the intereſt of the beſt men; he had a very engaging behaviour, and did not want induſtry nor application; he gave into the greateſt looſeneſs, but was a good ſoldier. Nor do I believe there was ever the like monſter in the world, made of ſuch jarring and repugnant qualities and inclinations. Who at one time was more acceptable to the beſt men, and who more intimate with the worſt? Who was once a better patriot, and who a greater enemy to this ſtate? Who more devoted to pleaſures, who more patient in labours? Who more rapacious, and yet more profuſe? He ſuited himſelf to the humours of all he converſed with: was ſerious with the reſerved, and pleaſant with the jocoſe; grave with the aged, and facetious with the young; bold with the daring, and extravagant with the profligate.”—Such a character of a man, when accompanied with power and intereſt, muſt render him no leſs the object of fear, than deteſtation; which was the deſign of Cicero in this deſcription. And elſewhere, in order to prevail with the ſenate to direct the execution of thoſe conſpirators with Catiline who were then in priſon, he paints the moſt diſmal ſcene of that horrid deſign in the ſtrongeſt colours. “Methinks (ſays he) I ſee this city, the light of the world, and citadel of all nations, ſuddenly falling into one fire; I perceive heaps of miſerable citizens unburied in their ruined country; the countenance and fury of Cethegus raging in your ſlaughter, preſents itſelf to my view.” This figure is very ſerviceable in amplification, as we have formerly ſhewn in treating upon that ſubject. But no ſmall judgment is required in the management of deſcriptions. Leſſer circumſtances ſhould either be wholly omitted, or but ſlightly touched; and thoſe which are more material drawn in their due proportion. Nature is as much the rule of the orator as of the painter, and what they both propoſe to imitate. And therefore, let a thought be ever ſo pleaſing and beautiful in itſelf, it muſt not be introduced when foreign to the purpoſe, or out of its place; any more than a painter ſhould attempt to alter nature, when he propoſes to copy it. This figure requires likewiſe a vigorous and lively genius. For the images in deſcription can riſe no higher than the conception of the ſpeaker, ſince the idea muſt firſt be formed in his own mind before he can convey it to others; and agreeably to the clearneſs with which he conceives it himſelf, he will be able to expreſs it in words.

92 *Aporia*, or *doubt*, expreſſes the debate of the mind with itſelf upon a preſſing difficulty. A perſon in ſuch a ſtate is apt to heſitate, or ſtart ſeveral things ſucceſſively, without coming to any fixed reſolution. The uneaſineſs ariſing from ſuch a diſorder of thought is naturally very moving. Of this kind is that of Cicero for Cluentius, when he ſays, “I know not which way to turn myſelf. Shall I deny the ſcandal thrown upon him of bribing the judges? Can I ſay the people were not told of it? that it was not talked of in the court? mentioned in the ſenate? Can I remove an opinion ſo deeply and long rooted in the minds of men? It is not in my power. You, judges, muſt ſupport his innocence, and reſcue him from this calamity.” Orators ſometimes chooſe to begin their diſcourſe with this figure. A diffidence of mind at firſt is not unbecoming, but graceful. It carries in it an air of modeſty, and tends very much to conciliate the affections of the hearers. Livy gives us a very elegant example of this, in a ſpeech of Scipio Africanus to his ſoldiers, when, calling them together after a ſedition, he thus beſpeaks them: “I never thought I ſhould have been at a loſs, in what manner to addreſs my army. Not that I have applied myſelf more to words, than things; but becauſe I have been accuſtomed to the genius of ſoldiers, having been trained up in the camp almoſt from my childhood. But I am in doubt what or how to ſpeak to you, not knowing what name to give you. Shall I call you *citizens*, who have revolted from your country? *Soldiers*, who have diſowned the authority of your general, and broke your military oath? *Enemies?* I perceive the mien, the aſpect, and habit of citizens; but diſcern the actions, words, deſigns, and diſpoſitions of enemies.”

93 Sometimes a paſſion has that effect, not ſo much to render a perſon doubtful what to ſay, as to ſtop him in the midſt of a ſentence, and prevent his expreſſing the whole of what he deſigned; and then it is called *Apoſiopeſis*, or *concealment*. It denotes different paſſions; as anger, which, by reaſon of its heat and vehemence, cauſes perſons to break off abruptly in their diſcourſe. So the old man in Terence, when he was jealous that his ſervant obſtructed his deſigns, uſes this imperfect, but threatening expreſſion; *Whom, if I find*.” And Neptune, when deſcribed by Virgil as very angry that the winds ſhould preſume to diſturb the ſea without his permiſſion, after he has called them to him to know the reaſon of it, threatens them in this abrupt manner:

“Whom I——but firſt I'll lay the ſtorm.”

But Cicero, in writing to Atticus, applies it to expreſs grief, where he ſays, “I know nothing of Pompey, and believe he muſt be taken, if he is not got on ſhipboard. O incredible ſwiftneſs! But of our friend.—Though I cannot accuſe him without grief, for whom I am in ſo much concern and trouble.” And in a letter to Caſſius he uſes it to expreſs fear, when he ſays to him, “Brutus could ſcarce ſupport himſelf at Mutina; if he is ſafe, we have carried the day. But if—heaven avert the omen! all muſt have recourſe to you.” His meaning is, “If Brutus ſhould be defeated.”

94 The next figure is *eroteſis*, or *interrogation*. But every interrogation or queſtion is not figurative. When we inquire about a thing that is doubtful, in order to be informed, this is no figure, but the natural form of ſuch expreſſions. As if I aſk a perſon, *Where he is going?* or *What he is doing?* But then it becomes figurative when the ſame thing may be expreſſed in a direct manner; but the putting it by way of queſtion gives it a much greater life and ſpirit. As when Cicero ſays, “Catiline, how long will you abuſe our patience? do not you perceive your deſigns are diſcovered?” He might indeed have ſaid, *You abuſe our patience a long while. You muſt be ſenſible your deſigns*

are diſcovered. But it is eaſy to perceive how much this latter way of expreſſion falls ſhort of the force and vehemence of the former. And ſo when Medea ſays, *I could ſave; and do you aſk, if I can deſtroy?* Had ſhe ſaid, *I could ſave, and I can deſtroy,* the ſentence had been flat, and very unfit to expreſs the rage and fury in which the poet there repreſents her. This figure is ſuited to expreſs moſt paſſions and emotions of the mind, as anger, diſdain, fear, deſire, and others. It ſerves alſo to preſs and bear down an adverſary. Cicero frequently makes this uſe of it. As in his defence of Plancius: “I will make you this offer (ſays he) chooſe any tribe you pleaſe, and ſhew, as you ought, by whom it was bribed; and if you cannot, as I believe you will not undertake it, I will prove how he gained it. Is this a fair conteſt? Will you engage on this foot? I cannot give you fairer play. Why are you ſilent? Why do you diſſemble? Why do you heſitate? I inſiſt upon it, urge you to it, preſs it, require, and even demand it of you.” Such a way of puſhing an antagoniſt ſhews the ſpeaker has great confidence in his cauſe; otherwiſe he would never lay himſelf ſo open, if he was not aſſured the other party had nothing to reply. This figure likewiſe diverſifies a diſcourſe, and gives it a beautiful variety, by altering the form of expreſſion; provided it be neither too frequent, nor continued too long at once. And beſides the warmth and eager manner in which it is expreſſed, enlivens the hearers, and quickens their attention.

95 *Ecphoneſis*, or *exclamation*, is a vehement extenſion of the voice, occaſioned by a commotion of mind, naturally venting itſelf by this figure, which is uſed by Cicero to expreſs a variety of paſſions. It often denotes reſentment or indignation. Thus, after his return from baniſhment, reflecting on thoſe who had occaſioned it, he breaks out into this moving exclamation: “O mournful day to the ſenate, and all good men, calamitous to the ſtate, afflictive to me and my family, but glorious in the view of poſterity!” His deſign was to excite an odium againſt the authors of his exile, when recalled in ſo honourable a manner. And again in his defence of Cælius: “O the great force of truth; which eaſily ſupports itſelf againſt the wit, craft, ſubtilty, and artful deſigns of men!” He had been juſt ſhewing the abſurdity of the charge againſt Cælius, and now endeavours to expoſe his accuſers to the indignation of the court. At other times it is uſed to expreſs diſdain or contempt. As when ſpeaking of Pompey's houſe, which was bought by Mark Anthony, he ſays: “O conſummate impudence! dare you go within that houſe! dare you enter that venerable threſhold, and ſhow your audacious countenance to the tutelar deities, which reſide there?” Nor is it leſs ſuited to indicate grief, as when he ſays of Milo: “O that happy country, which ſhall receive this man! ungrateful this, if it baniſh him! miſerable, if it loſe him!” And ſometimes it ſerves to expreſs admiration; as when, in compliment to Cæſar, he ſays, “O admirable clemency! worthy of the greateſt praiſe, the higheſt encomiums, and moſt laſting monuments!” It has its uſe alſo in ridicule and irony. As in his oration for Balbus, where he derides his accuſer, by ſaying, “O excellent interpreter of the law! maſter of antiquity! corrector and amender of our conſtitution!” The ſacred writers ſometimes uſe it by way of intreaty or wiſh. As the royal Pſalmiſt: “O that I had the wings of a dove, that I might flee away, and be at reſt!” And at other times in triumph and exultation, as in that of St Paul: “O death, where is thy ſting! O grave, where is thy victory!” It is frequently joined with the preceding figure, *interrogation;* as appears in ſome of the inſtances here brought from Cicero. And it generally follows the repreſentation of the thing which occaſions it. Though ſometimes it is made uſe of to introduce it, and then it ſerves to prepare the mind by exciting its attention. Thus Cicero, in his defence of Cælius, to render the character of Clodia more odious, at whoſe inſtigation he was accuſed, inſinuates that ſhe had before poiſoned her huſband; and to heighten the barbarity of the fact, and make it appear the more ſhocking, he introduces the account of it, with this moving exclammation: “O heavens, why do you ſometimes wink at the greateſt crimes of mankind, or delay the puniſhment of them to futurity!”

Epiphonema, or *acclamation*, has a great affinity with the former figure. 96 And it is ſo called, when the ſpeaker, at the concluſion of his argument, makes ſome lively and juſt remark upon what he has been ſaying, to give it the greater force, and render it the more affecting to his hearers. It is not ſo vehement and impetuous as exclamation, being uſually expreſſive of the milder and more gentle paſſions. And the reflection ought not only to contain ſome plain and obvious truth, but likewiſe to ariſe naturally from the diſcourſe which occaſioned it, otherwiſe it loſes its end. When Cicero has ſhewn, that recourſe is never to be had to force and violence, but in caſes of the utmoſt neceſſity, he concludes with the following remark: “Thus to think, is prudence; to act, fortitude; both to think and act, perfect and conſummate virtue.” And elſewhere, after he has deſcribed a ſingular inſtance of cruelty and breach of friendſhip: “Hence (ſays he) we may learn, that no duties are ſo ſacred and ſolemn, which covetouſneſs will not violate.” This figure is frequently expreſſed in a way of admiration. As when Cicero has obſerved, that all men are deſirous to live to an advanced age, but uneaſy under it when attained, he makes this juſt reflection upon ſuch a conduct: “So great is their inconſtancy, folly, and perverſeneſs!”

The next figure in order is *apoſtrophe*, or *addreſs*, 97 when the ſpeaker breaks off from the ſeries of his diſcourſe, and addreſſes himſelf to ſome particular perſon preſent or abſent, living or dead; or to inanimate nature, as endowed with ſenſe and reaſon. By this means he has an opportunity of ſaying many things with greater freedom than perhaps would be conſiſtent with decency if immediately directed to the perſons themſelves. He can admoniſh, chide, or cenſure, without giving offence. Nor is there any paſſion, but may be very advantageouſly expreſſed by this figure. When an orator has been ſpeaking of any particular perſon, on a ſudden to turn upon him, and apply the diſcourſe to that perſon himſelf, is very moving; it is like attacking an adverſary by ſurprize, when he is off his guard, and where he leaſt expects it. Thus Cicero: “I deſire, ſenators, to be merciful, but not to appear negligent in ſo great dangers of the ſtate; tho at preſent I cannot but condemn myſelf of remiſſneſs. There is a camp formed in Italy, at the entrance of Etruria, againſt the ſtate; our enemies increaſe daily; but we ſee the commander of the camp, and general of the enemies, within our walls, in the very ſenate, contriving ſome inteſtine ruin to the ſtate. If now, Catiline, I ſhould order you to be ſeized and put to death, I have reaſon to fear, that all good men would rather think I had deferred it too long, than charge me with cruelty. But I am prevailed with for a certain reaſon not to do that yet, which ought to have been done long ſince." This ſudden turn of the diſcourſe to Catiline himſelf, and the addreſs to him in that unexpected manner, muſt have touched him very ſenſibly. So in his defence of Milo, expreſſing his concern if he ſhould not ſucceed in it, he ſays: "And how ſhall I anſwer it to you, my brother Quintus, the partner of my misfortunes, who art now abſent." And elſewhere addreſſing to the ſoldiers of the Martian legion, who had been killed in an engagement with Mark Anthony, he thus beſpeaks them: "O happy death, which due to nature, was paid to your country! I may eſteem you truly born for your country, who likewiſe received your name from Mars; ſo that the ſame deity ſeems to have produced this city for the world, and you for this city." And in his oration for Balbus he thus calls upon dumb nature to witneſs to Pompey's virtues: "I invoke you, mute regions; you, moſt diſtant countries; you ſeas, havens, iſlands, and ſhores. For what coaſt, what land, what place is there, in which the marks of his courage, humanity, wiſdom, and prudence, are not extant?" An appeal to heaven, or any part of inanimate nature, has ſomething very ſublime and ſolemn in it, which we often meet with in ſacred writ. So the divine prophet: "Hear, O heavens! and give ear, O earth! for the Lord hath ſpoken." And in like manner, the prophet Jeremy: "Be aſtoniſhed, O ye heavens, at this."

98 *Proſopopæa*, or *the fiction of a perſon:* by which, either an abſent perſon is introduced ſpeaking; or one who is dead, as if he was alive and preſent; or ſpeech is attributed to ſome inanimate being. There is no figure, perhaps, which ſerves more or better purpoſes to an orator than this. For by this means he is enabled to call in all nature to his aſſiſtance, and can aſſign to every thing ſuch parts as he thinks convenient. There is ſcarce any thing fit to be ſaid, but may be introduced this way. When he thinks his own character is not of ſufficient weight to affect his audience in the manner he deſires, he ſubſtitutes a perſon of greater authority than himſelf to engage their attention. When he has ſevere things to ſay, and which may give offence as coming from himſelf; he avoids this, by putting them into the mouth of ſome other perſon from whom they will be better taken; or makes inanimate nature bring a charge, or expreſs a reſentment, to render it the more affecting. And by the ſame method he ſometimes chooſes to ſecure himſelf from a ſuſpicion of flattery, in carrying a compliment too high. We meet with ſeveral very beautiful inſtances of this figure in Cicero; but an example of each ſort may here ſuffice, beginning with that of an abſent perſon, from his defence of Milo, whom he thus introduces as ſpeaking to the citizens of Rome: "Should he, holding the bloody ſword, cry out, Attend, I pray, hearken, O citizens, I have killed Publius Clodius; by this ſword and by this right hand, I have kept off his rage from your necks, which no laws, no courts of judicature, could reſtrain; it is by my means, that juſtice, equity, laws, liberty, ſhame, and modeſty, remain in the city. Is it to be feared how the city would bear this action? Is there any one now, who would not approve and commend it." And in his oration for Balbus, he introduces Marius, who was then dead, to plead in his defence: "Can Balbus (ſays he) be condemned, without condemning Marius for a like fact? Let him be preſent a little to your thoughts, ſince he cannot be ſo in perſon; that you may view him in your minds, though you cannot with your eyes. Let him tell you, he was not unacquainted with leagues, void of examples, or ignorant of war." And again, in his firſt invective againſt Catiline, he repreſents his country as thus expoſtulating with himſelf, and upbraidiug him for ſuffering ſuch a criminal as Catiline to live. "Should my country (ſays he), which is much dearer to me than my life, ſhould all Italy, all the ſtate, thus addreſs me, Mark Tully, what do you do? Do you ſuffer him, whom you have found to be an enemy, who you ſee is to be at the head of the war, whom you perceive your enemies wait for in their camp as their general, who has been the contriver of this wickedneſs, the chief of the conſpiracy, the exciter of ſlaves and profligate citizens, to leave the city, which is rather to bring him in, than let him out? Will not you order him to be impriſoned, condemned, and executed? What prevents you? The cuſtom of our anceſtors? But private perſons have often puniſhed pernicious citizens in this ſtate. The 99
laws relating to the puniſhment of Roman citizens? But traitors never had the rights of citizens. Do you fear the cenſure of poſterity? Truly you make a very handſome return to the people of Rome, who have advanced you from an obſcure condition ſo early to the higheſt dignity; if you neglect their ſafety to avoid envy, or from the apprehenſion of any danger. And if you fear cenſure; which is moſt to be dreaded, that which may ariſe from juſtice and fortitude, or from cowardice and treachery? When Italy ſhall be waſted by a war, cities plundered, and houſes burnt, do you think then to eſcape the ſevereſt cenſure." In the management of this figure, care ſhould be taken, that what is ſaid be always conſiſtent with the character introduced, in which both the force and beauty of it conſiſt.

In treating upon figures, we have hitherto conſidered them ſeparately; but it may not be amiſs to obſerve, that ſome expreſſions conſiſt of a complication of them, and may come under the denomination of ſeveral figures, as well verbal as thoſe of ſentences, differently conſidered. Thus when Cicero ſays: "What, Tubero, did your drawn ſword do in the Pharſalian battle? at whoſe ſide was its point directed? what was the intention of your arms?" As he ſpeaks to Tubero, it is an apoſtrophe; as the expreſſions have much the ſame import, and are deſigned to heighten and aggravate the fact, it is *exergaſia;* and as they are put by queſtion, it is *interrogation*. So likewiſe in his ſecond Philippic, where he ſays, "What can I think? that I am contemned? I ſee nothing in my life, intereſt, actions, or abilities, as moderate as they are, which Anthony can deſpiſe. Did he think he could eaſily leſſen me in the ſenate? But they, who have commended many famous citizens for their good government of the ſtate, never thanked any but me for preſerving it. Would he contend with me for eloquence? This would be a favour indeed. For what could be a larger and more copious ſubject, than for me to ſpeak for myſelf againſt Anthony? His deſign was really this: he thought he could nor convince his aſſociates, that he was truly an enemy to his country, unleſs he was ſo firſt to me." There are three figures in this paſſage; *doubt*, *interrogation*, and *ſubjection*. And again, when he introduces Sicily thus addreſſing to Verres in a way of complaint: "Whatever gold, whatever ſilver, whatever ornaments in my cities, dwellings, temples, whatever right of any kind I poſſeſſed by the favour of the ſenate and people of Rome; you, Verres, have plundered and taken from me." Here is a *proſopopeia*, joined with the verbal figure *anaphora*, as ſeveral members of the ſentence begin with the ſame word. The like inſtances of complex figures frequently occur, and therefore we need not multiply examples of them here.

PARTICULAR ELOCUTION,

Or that part of Elocution which conſiders the ſeveral Properties and Ornaments of Language, as they are made uſe of to form different ſorts of Style.

CHAP. IV. *Of Style, and its different Characters.*

99 THE word *ſtyle*, properly ſignifies the inſtrument which the ancients uſed in writing. For as they commonly wrote upon thin boards covered over with wax, and ſometimes upon the barks of trees, they made uſe of a long inſtrument like a bodkin, pointed at one end, with which they cut their letters; and broad at the other, to eraze any thing they choſe to alter. And this the Latins called *ſtilus*. But tho' this be the firſt ſenſe of the word, yet afterwards it came to denote the manner of expreſſion. In which ſenſe we likewiſe uſe it, by the ſame kind of trope that we call any one's writing his *hand*. But as to the reaſons which occaſion a variety of ſtyle, they are principally theſe.

Since both ſpeech and writing are only ſenſible expreſſions of our thoughts, by which we communicate them to others; as all men think more or leſs differently, ſo conſequently they in ſome meaſure differ in their ſtyle. No two perſons, who were to write upon one ſubject, would make uſe of all the ſame words. And were this poſſible, yet they would as certainly differ in their order and connection, as two painters, who uſed the ſame colours in painting the ſame picture, would neceſſarily vary their mixtures and diſpoſition of them, in the ſeveral gradations of lights and ſhades. As every painter therefore has ſomething peculiar in his manner, ſo has every writer in his ſtyle. It is from theſe internal characters, in a good meaſure, that critics undertake to diſcover the true authors of anonymous writings; and to ſhew that others are ſpurious, and not the genuine productions of thoſe whoſe names they bear; as they judge of the age of ſuch writings from the words and manner of expreſſion which have been in uſe at different times. And we may often obſerve in perſons a fondneſs for ſome particular words or phraſes; and a peculiarity in the turn or connection of their ſentences, or in their tranſitions from one thing to another; by which their ſtyle may be known, even when they deſign to conceal it. For theſe things, thro' cuſtom and habit, will ſometimes drop from them, notwithſtanding the greateſt caution to prevent it.

There is likewiſe very often a conſiderable difference in the ſtyle of the ſame perſon, in ſeveral parts of his life. Young perſons, whoſe invention is quick and lively, commonly run into a pompous and luxuriant ſtyle. Their fancy repreſents the images of things to their mind in a gay and ſpritely manner, cloathed with a variety of circumſtances; and while they endeavour to ſet off each of theſe in the brighteſt and moſt glittering colours, this renders their ſtyle verboſe and florid, but weakens the force and ſtrength of it. And therefore, as their imagination gradually cools, and comes under the conduct of a more mature judgment, they find it proper to cut off many ſuperfluities; ſo that by omitting unneceſſary words and circumſtances, and by a cloſer connection of things placed in a ſtronger light, if their ſtyle becomes leſs ſwelling and pompous, it is, however, more correct and nervous. But as old age ſinks the powers of the mind, chills the imagination, and weakens the judgement; the ſtyle, too, in proportion uſually grows dry and languid. Critics have obſerved ſomething of this difference in the writings even of Cicero himſelf. To be maſter of a good ſtyle, therefore, it ſeems neceſſary that a perſon ſhould be endued with a vigorous mind and lively fancy, a ſtrong memory, and a good judgement. It is by the imagination that the mind conceives the images of things. If the impreſſions of thoſe images be clear and diſtinct, the ſtyle will be ſo too; ſince language is nothing but a copy of thoſe images firſt conceived by the mind. But if the images are faint and imperfect, the ſtyle will accordingly be flat and languid. This is evident from the difference between ſuch objects as are repreſented to our ſight, and things of which we have only read or heard. For as the former generally make a deeper impreſſion upon our minds, ſo we can deſcribe them in a more ſtrong and lively manner. And we commonly find, that according as perſons are affected themſelves when they ſpeak, they are able to affect others with what they ſay. Now perſons are more or leſs affected with things in proportion to the impreſſions which the images of thoſe things make upon the mind. For the ſame reaſon alſo, if the imagination be dull, and indiſpoſed to receive the ideas of things, the ſtyle will be ſtiff and heavy; or if the images are irregular and diſordered, the ſtyle will likewiſe be perplexed and confuſed. When things lie ſtraight (as we ſay) in the mind, we expreſs them with eaſe, and in their juſt connection and dependence; but when they are warpt and crooked, we deliver them with pain and difficulty, as well as diſorder. A good fancy ſhould likewiſe be accompanied with a happy memory. This helps us to retain the names of thoſe things the ideas whereof are preſented to the mind by the imagination, together with proper and ſuitable phraſes to expreſs them in their ſeveral connections and relations to each other. When the images of things offer themſelves to the mind, unleſs the names of them preſent themſelves at the ſame time, we are at a loſs to expreſs them, or at leaſt are in danger of doing it by wrong and improper terms. Beſides, variety is neceſſary in diſcourſe to render it agreeable; and therefore, without a large furniture of words and phraſes, the ſtyle will neceſſarily become inſipid and jejune, by the frequent return of the ſame terms and manner of expreſſion. But to both theſe a ſolid judgment is highly requiſite to form a juſt and accurate ſtyle. A fruitful imagination will furniſh the mind with plenty of ideas, and a good memory will help to clothe them in proper language; but unleſs they are both under the conduct of reaſon, they are apt to hurry perſons into many inconveniences. Such are generally great talkers, but far from good orators. Freſh images continually crowd in upon them, faſter than the tongue can well expreſs them. This runs them into long and tedious diſcourſes, abounding with words, but empty of ſenſe. Many impertinencies, if not improprieties, neceſſarily mix themſelves with what they ſay; and they are frequently carried off from their point, by not having their fancies under a proper regulation. So that ſuch diſcourſes, though compoſed perhaps of pretty expreſſions, rhetorical flowers, and ſprightly ſallies of wit, yet fall very much ſhort of a ſtrong and manly eloquence. But where reaſon preſides and holds the reins, every thing is weighed before it is ſpoken. The propereſt words are made choice of, which beſt ſuit the ideas they are deſigned to convey; rather than the moſt gay and pompous. All things are not ſaid, which offer themſelves to the mind, and fancy dictates; but ſuch only as are fit and proper, and the reſt are dropped. Some things are but ſlightly mentioned, and others diſcourſed on more largely and fully, according to their different importance. And every thing is placed in that order, and cloathed in ſuch a dreſs, as may repreſent it to the greateſt advantage. So that, in a word, the foundation of a good ſtyle is chiefly good ſenſe. Where theſe qualities all meet in a conſiderable degree, ſuch perſons have the happineſs to excell, either in ſpeaking or writing. But this is not generally the caſe. Many perſons of a vigorous and ſpritely imagination, have but a weak judgment; and others much more judicious can think but ſlowly. And it is this, in a great meaſure, which makes the difference between ſpeaking and writing well, as one or the other of theſe qualities is predominant. A perſon of a lively fancy, ready wit, and voluble tongue, will deliver himſelf off hand much better and more acceptably, than one who is capable, upon due premeditation, to diſcern farther into the ſubject, but cannot command his thoughts with the ſame eaſe and freedom. And this latter would have the ſame advantage of the other, were they both coolly to offer their ſentiments in writing. Many things appear well in ſpeaking, which will not bear a ſtrict ſcrutiny. While the hearer's attention is obliged to keep pace with the ſpeaker, he is not at leiſure to obſerve every impropriety or incoherence, but many ſlips eaſily eſcape him, which in reading are preſently diſcovered. Hence it is often found, that diſcourſes, which were thought very fine when heard, appear to have much leſs beauty, as well as ſtrength, when they come to be read. And therefore it is not without reaſon, that Cicero recommends to all thoſe who are candidates for eloquence, and deſirous to become maſters of a good ſtyle, to write much. This affords them an opportunity to digeſt their thoughts, weigh their words and expreſſions, and give every thing its proper force and evidence; as likewiſe, by reviewing a diſcourſe when compoſed, to correct its errors, or ſupply its defects; till by practice they gain a readineſs both to think juſtly, and to ſpeak with propriety and eloquence. But it is time to proceed to ſome other cauſes of the diverſity of ſtyle.

Different countries have not only a different language, but likewiſe a peculiarity of ſtyle ſuited to their temper and genius. The eaſtern nations had a lofty and majeſtic way of ſpeaking. Their words are full and ſonorous, their expreſſions ſtrong and forcible, and warmed with the moſt lively and moving figures. This is very evident from the Jewiſh writings in the Old Teſtament, in which we find a moſt agreeable mixture of ſimplicity and dignity. On the contrary, the ſtyle of the more northern languages generally partakes of the chilneſs of their climate. "There is," ſays Mr Addiſon*, "a certain coldneſs and indifference in the phraſes of our European languages, when they are compared with the oriental forms of ſpeech. And it happens very luckily, that the Hebrew idioms run into the Engliſh tongue with a peculiar grace and beauty. Our language has received innumerable elegancies and improvements from that infuſion of Hebraiſms, which are derived to it out of the poetical paſſages in holy writ. They give a force and energy to our expreſſions, warm and animate our language, and convey our thoughts in more ardent and intenſe phraſes than any that are to be met with in our own tongue. There is ſomething ſo pathetic in this kind of diction, that it often ſets the mind in a flame, and makes our hearts burn within us."

Again, people of different nations vary in their cuſtoms and manners, which occaſions a diverſity in their ſtyle. This was very remarkable in the Attics, Aſiatics, and Rhodians, and is often taken notice of by ancient writers. The Athenians, while they continued a free ſtate, were an active, induſtrious, and frugal people; very polite indeed, and cultivated arts and ſciences beyond any other nation: but as they had powerful enemies, and were exceeding jealous of their liberties, this preſerved them from wantonneſs and luxury. And their way of ſpeaking was agreeable to their conduct; accurate and cloſe, but very full and expreſſive. The Aſiatics, on the other hand, were more gay, and looſe in their manners, devoted to luxury and pleaſure; and accordingly they affected a florid and ſwelling ſtyle, filled with redundancies and ſuperfluities of expreſſion. Indeed, ſome of the ancients have attributed this looſeneſs of ſtyle to their way of purſuing eloquence at firſt. For as they were put upon it by converſing with the Greek colonies who ſettled among them, they ſuppoſe, that in imitating them, before they were maſters of the language, they were often obliged to make uſe of circumlocutions,

---

* Spect. nº 405.

tions, which afterwards became habitual, and very much weakened the force of their expreſſions, as it naturally would do. But one would think, if they were put to this neceſſity at firſt, when they found its ill effect, they might eaſily have amended it afterwards, as they grew better acquainted with the Greek language, had they been inclined ſo to do. The Rhodian ſtyle was a medium between the other two; not ſo conciſe and expreſſive as the Attic, nor yet ſo looſe and redundant as the Aſiatic. Quintilian ſays, it had a mixture of its author, and the humour of the people; and, like plants ſet in a foreign ſoil, degenerated from the Attic purity, but not ſo wholly as to loſe it. They firſt received it from Æſchines, who being worſted in his famous conteſt with Demoſthenes, retired thither, and taught rhetoric, which put them upon the ſtudy of eloquence.

The ſtyle of the ſame country likewiſe very much alters in different ages. Cicero tells us, that the firſt Latin hiſtorians aimed at nothing more than barely to make themſelves intelligible, and that with as much brevity as they could. Thoſe who ſucceeded them advanced a ſtep further; and gave ſomewhat a better turn and cadency to their ſentences, though ſtill without any dreſs or ornament. But afterwards, when the Greek language became faſhionable at Rome, by copying after their writers, ſuch as Herodotus, Thucydides, Xenophon, and others, they endeavoured to introduce all their beauties into their own tongue, which in Cicero's time was brought to its higheſt perfection. But it did not long continue in that ſtate. A degeneracy of manners ſoon altered their taſte, and corrupted their language, which Quintilian very much complains of in his time. The caſe was the ſame with reſpect to the Greek tongue; though that had the good fortune to continue its purity much longer than the Latin. Nor can any language be exempt from the common fate of all human productions; which have their beginning, perfection, and decay. Beſides, there is a ſort of faſhion in language, as well as other things, and the generality of people are always fond of running into the mode. Perhaps ſome one, or a few perſons, fall into a manner which happens to pleaſe. This gives them a reputation; and others immediately copy after them, till it generally prevail. Cicero tells us, that the moſt ancient Greek orators, whoſe writings were extant in his time, ſuch as Pericles, Alcibiades, and others, were ſubtle, acute, conciſe, and abounded in ſenſe rather than words. But another ſet that followed them, of which were Critias, Theramenes, and Lyſias, retained the good ſenſe of the former, and at the ſame time took more care of their ſtyle; not leaving it ſo bare as the former had done, but furniſhing it with a better dreſs. After theſe came Iſocrates, who added all the flowers and beauties of eloquence. And as he had abundance of followers, they applied theſe ornaments and decorations according to their different genius; ſome for pomp and ſplendour; and others to invigorate their ſtyle, and give it the greater force and energy. And in this latter way Demoſthenes principally excelled. Now as each of theſe manners had its peculiar beauties, and generally prevailed in different ages; Cicero think this could not have happened otherwiſe than from imitation. And he attributes it to the ſame cauſe, that afterwards they ſunk into a ſofter and ſmoother manner, not leſs exact and florid, but more cold and lifeleſs. If we take a view of our own tongue, Chaucer ſeems to have been the firſt who made any conſiderable attempts to cultivate it. And whoever looks into him, will perceive the difference to be ſo great from what it is at preſent, that it ſcarce appears to be the ſame language. The gradual improvements it has ſince received, are very evident in the writers almoſt of every ſucceeding age ſince that time; and how much farther it may ſtill be carried, time only can diſcover. See LANGUAGE.

Another cauſe of the variety of ſtyle ariſes from the different nature and properties of language. A difference in the letters, the make of the words, and the order of them, do all affect the ſtyle. So Quintilian obſerves, that the Latin tongue cannot equal the Greek in pronunciation, becauſe it is harſher. The Latins want two of the ſofteſt Greek letters, υ and ζ; and uſe others of a very hard ſound, which the Greeks have not, as *f* and *q*. Again, many Latin words end in *m*; a letter of a broad and hollow ſound, which never terminates any Greek word; but ν does frequently, whoſe ſound is much ſofter and ſweeter. Beſides, in the combination of ſyllables, the letters *b* and *d* are often ſo ſituated, as to require too ſtrong and unequal a force to be laid upon them, as in the words *obverſus* and *adjungo*. Another advantage of the Greek tongue ariſes from the variety and different ſeat of the accents: for the Greeks often accent the laſt ſyllable, which both enlivens the pronounciation, and renders it more muſical; whereas the Latins never do this. But the greateſt advantage of the Greeks lies in their plenty and variety of words; for which reaſon they have leſs occaſion for tropes or circumlocutions, which, when uſed from neceſſity, have generally leſs force, and weaken the ſtyle. But under theſe diſadvantages, Quintilian ſeems to give his countrymen the beſt advice the caſe will admit of: That what they cannot do in words, they ſhould make up in ſenſe. If their expreſſions are not ſo ſoft and tender, they ſhould exceed in ſtrength; if they are leſs ſubtile, they ſhould be more ſublime; and if they have fewer proper words, they ſhould excell in the beauty as well as number of their figures. If this account of Quintilian be juſt, that the Greek tongue does ſurpaſs the Latin in all theſe inſtances, it is certain that both of them have much greater advantages over ſome modern languages. The varying all their declinable words, both nouns and verbs, by terminations, and not by ſigns, contributes very much to the ſmoothneſs and harmony of their periods. Whereas in the modern languages, thoſe ſmall particles and pronouns, which diſtinguiſh the caſes of nouns, and the tenſes and perſons of verbs, hinder the run of a period, and render the ſound much more rough and uneven. Beſides, the ancient languages ſeem to have a better and more equal mixture of vowels and conſonants, which makes their pronunciation more eaſy and muſical.

But the chief diſtinction of ſtyle ariſes from the different ſubjects, or matter of diſcourſe. The ſame way of ſpeaking no more ſuits all ſubjects, than the ſame garment would all perſons. A prince and a peaſant ought not to have the ſame dreſs; and another different from both becomes thoſe of a middle ſtation in life. The ſtyle therefore ſhould always be adapted to the nature of the ſubject, which rhetoricians have reduced to threee ranks or degrees; the *low* or *plain* ſtyle, the *middle* or *temperate*, and the *lofty* or *ſublime*: Which are likewiſe called *characters*, becauſe they denote the quality of the ſubject upon which they treat. This diviſion of ſtyle into three characters, was taken notice of very early by ancient writers. Some have obſerved it even in Homer, who ſeems to aſſign the *ſublime* or magnificent to Ulyſſes, when he repreſents him ſo copious and vehement an orator, that his words came from him *like a winter ſnow*. On the contrary, he deſcribes Menelaus as a *polite* ſpeaker, but *conciſe* and *moderate*. And when he mentions Neſtor, he repreſents his manner as between theſe two, not ſo high and lofty as the one, nor yet ſo low and dreſſed as the other; but ſmooth, even, and pleaſant, or, as he expreſſes it, *more ſweet than honey*. Quintilian obſerves, that although accuracy and politeneſs were general characters of the Attic writers; yet among their orators, Lyſias excelled in the *low and familiar* way; Iſocrates for his *elegancy*, *ſmoothneſs*, and the *fine turn of his periods*; and Demoſthenes for his *flame and rapidity*, by which he carried all before him. And Gellius tells us, that the like difference was found in the three philoſophers who were ſent from the Athenians to Rome (before the Romans had any reliſh for the polite arts) to ſolicit the remittance of a fine laid upon them for an injury done to a neighbouring ſtate. Carneades, one of thoſe ambaſſadors, was *vehement and rapid* in his harangues; Critolaus, *neat and ſmooth*; and Diogenes, *modeſt and ſober*. The eloquence of theſe orators, and the agreeable variety of their different manner, ſo captivated the Roman youth, and inflamed them with a love of the Grecian arts, that old Cato, who did all he could to check it by hurrying away the ambaſſadors, could not prevent their vigorous purſuit of them, till the ſtudy became in a manner univerſal. And the old gentleman afterwards learned the Greek language himſelf, when it became more faſhionable. Which a noble writer of ours * repreſents as *a puniſhment upon him for his former crime*. It ſeldom happens that the ſame perſon excells in each of theſe characters. They ſeem to require a different genius, and moſt people are naturally led to one of them more than another; though all of them are requiſite for an orator upon different occaſions, as we ſhall ſhew hereafter.

Chap. V. *Of the Low Style.*

THIS we ſhall conſider under two heads, *thoughts* and *language*; in each of which theſe ſeveral characters are diſtinguiſhed from one another. 100

I. And with reſpect to the former, as the ſubjects proper for this ſtyle are either common things, or ſuch as ſhould be treated in a plain and familiar way; ſo
101 plain thoughts are moſt ſuitable to it, and diſtinguiſh it from the other characters.

Now, by plain thoughts, are meant ſuch as are ſimple and obvious, and ſeem to riſe naturally from the ſubject, when duly conſidered; ſo that any one, upon firſt hearing them, would be apt to imagine they muſt have occurred to himſelf. Not that this is really the caſe, but becauſe the more natural a thing is, the more eaſy it ſeems to be; though in reality it is often otherwiſe; and the perfection of art lies in its neareſt reſemblance to nature. And therefore, in order to ſpeak plainly and clearly upon any ſubject, it muſt firſt be duly conſidered, well underſtood, and thoroughly digeſted in the mind; which, though it require labour and ſtudy, yet the more a perſon is maſter of what he he ſays, the leſs that labour will appear in his diſcourſe. This natural plainneſs and ſimplicity, without any diſguiſe or affectation, very much contributes to give credit to what is ſaid. Nor is any thing more apt to impoſe on us, than the appearance of this, when artfully aſſumed. Cicero's account of the fight between Milo and Clodius, in which Clodius was killed, is a remarkable inſtance of this. "When Clodius knew (ſays he) that Milo was obliged to go to Lanuvium upon a ſolemn and neceſſary occaſion, he immediately haſtened from Rome, the day before, to aſſaſſinate him before Clodius's own houſe, as appeared afterwards by the event. And this he did at a time, when his turbulent mob in the city wanted his aſſiſtance; whom he would not have left, but for the advantage of that place and ſeaſon to execute his wicked deſign. But the next day Milo was in the ſenate, where he continued till they broke up; then went home; changed his dreſs; ſtaid there ſome time till his wife was ready; and afterwards ſet forward ſo late, that if Clodius had deſigned to return to Rome that day, he might have been here by that time. Clodius, prepared for his deſign, met him on horſeback, having no chariot, no equipage, no Greek attendants as uſual; and without his wife, which was ſcarce ever known: whereas Milo was in a chariot with his wife, wrapt up in a cloak, and attended by a large retinue of maid ſervants, pages, and other perſons unfit for an engagement. He met with Clodius before his houſe, about five o'clock in the evening; and was preſently aſſaulted from an higher ground by many armed men, who killed the coachman. Upon which, Milo, throwing off his cloak, leaped out of the chariot, and bravely defended himſelf: and thoſe who were with Clodius, having their ſwords drawn, ſome made up to the chariot to attack Milo; and others, who now thought he had been killed, began to fall upon his ſervants who were behind. And of theſe, ſuch as had courage, and were faithful to their maſter, ſome were killed; and others, when they ſaw the ſkirmiſh at the chariot, and could do their maſter no ſervice (for they heard Clodius himſelf ſay that Milo was killed, and really thought it was ſo), did that, not by their maſter's order, not with his knowledge, nor when he was preſent, which every one would have his own ſervants to do in the like circumſtances. I do not ſay this to fix any crime upon them, but only to relate what happened." His meaning is, they killed Clodius; which he avoids mentioning, to render what he ſays leſs offenſive. Can any thing be told in a more plain and ſimple manner than this? Here is nothing ſaid, but what in itſelf ſeems highly probable, and what one would imagine the fact might eaſily ſuggeſt to any ordinary ſpectator. But in this, both the art and ſkill of it conſiſt. For in the whole account, as, on the one hand, Milo is ſo deſcribed as to render it highly improbable he could have any deſign at that time againſt Clodius; ſo on the other, no one circumſtance is omitted which might ſeem proper to perſuade the hearers that Clodius was the aggreſſor in that engagement. And yet, if we may believe Aſconius, the quarrel was begun by ſome of Milo's retinue, and Clodius was afterwards killed by his expreſs order. But as things are ſometimes beſt illuſtrated by their oppoſites, we ſhall here produce a contrary inſtance of a very affected and unnatural way of relating a fact. Val. Maximus tells us of a learned man at Athens, who, by a blow which he received by a ſtone upon his head, entirely forgot all his learning, though he continued to remember every thing elſe. And therefore, as he ſays, ſince this miſfortune deprived him of the greateſt enjoyment of his life, it had been happier for him never to have been learned, than afterwards to loſe that pleaſure. This is the plain ſenſe of the ſtory. But now let us hear him relate it. "A man (ſays he) of great learning at Athens, having received a blow upon his head by a ſtone, retained the memory of all other things very perfectly, and only forgot his learning, to which he had chiefly devoted himſelf. The direful and malignant wound invading his mind, and as it were deſignedly ſurveying the knowledge repoſited there, cruelly ſeized on that part of it in particular from which he received the greateſt pleaſure, and buried the ſingular learning of the man with an invidious funeral. Who ſince he was not permitted to enjoy his ſtudies, had better never have obtained acceſs to them, than afterwards to have been deprived of the delight they afforded him." What an unnatural way is this of relating ſuch an accident, to talk of *a wound invading the mind*, and *ſurveying the knowledge repoſited there*, and *cruelly ſeizing a particular part of it*, and *burying it with an invidious funeral?* There is nothing in the ſtory could lead him to this, but an over-fondneſs to refine upon it in a very affected manner. But there are two properties of plain thoughts, one of which ought conſtantly to attend them in common with all thoughts, and the other is often neceſſary to animate and enliven this character.

---

* Lord Bacon.

The former of theſe is juſtneſs and propriety, which is what reaſon dictates in all caſes. What Cicero ſays of the death of Craſſus the orator, ſeems very juſt, as well as natural. "It was (ſays he) an affliction to his friends, a loſs to his country, and a concern to all good men; but ſuch public calamities followed upon it, that heaven ſeemed rather to have favoured him with death, than to have deprived him of life." This thought ſeems very juſt, and agreeable to the ſentiments of a good man, as Craſſus was, to chooſe death rather than to outlive the happineſs of his country, to which he himſelf had ſo much contributed. Quintilian has a reflection upon a like occaſion, which is not ſo juſt and becoming. It is upon the death of his only ſon, a youth of very uncommon parts, as he repreſents him; and for whoſe uſe he had deſigned his *Inſtitutions of Oratory*; but he died before they were finiſhed. The paſſage is this: "I have loſt him of whom I had formed the greateſt hopes, and in whom I had repoſed the greateſt comfort of my old age. What can I do now? or of what farther uſe can I think myſelf to be, thus diſappointed by heaven? What good parent will pardon me, if I can any longer ſtudy? and not condemn ſuch reſolution, if, thus ſurviving all my family, I can make any other uſe of my voice, than to accuſe the gods, and declare that providence does not govern the world?" Allowance may be made for the ſallies of paſſion, even in wiſe men, upon ſome ſhocking occaſions; but when it proceeds to ſuch a degree as to become impious, it is very indecent, as well as unjuſt. And all indecency is unnatural, as it is diſagreeable to reaſon, which always directs to a decorum. That ſeems to be a very natural as well as juſt thought of Pliny the Younger, when he ſays, "The death of thoſe perſons always appear to me too haſty and unſeaſonable, who are preparing ſome laſting work. For perſons wholly devoted to pleaſures, live, as it were, from day to day, and daily finiſh the end for which they live; but thoſe who have a view to poſterity, and preſerve their memory by their labours, always die untimely, becauſe they leave ſomething unfiniſhed. We ſhall mention but one more inſtance; and that in a comparative view, to make it the more evident. The two ſons of Junius Brutus, the firſt Roman conſul, having been convicted of treaſon in aſſociating with Tarquin's party, were ordered, among others, to be put to death; and their father not only pronounced the ſentence, but preſided at the execution. This fact is mentioned by ſeveral of the Roman hiſtorians; and, as it carries in it not only the appearance of rigorous juſtice, but likewiſe of cruelty in Brutus, to have been preſent at the execution of his ſons, they endeavour to vindicate him different ways. What Florus ſays, ſeems rather an affectation of wit, than a juſt defence of the fact. "He beheaded them (ſays he), that, being a public parent, he might appear to have adopted the whole body of the people." Nor does Val. Maximus come up to the caſe, who ſays, "He put off the father to act the conſul; and choſe rather to loſe his ſons, than be wanting to public juſtice." This might be a reaſon for condemning them; and would have been equally true, had he not been preſent at their execution. But Livy, whoſe thoughts are generally very juſt and natural, aſſigns the beſt reaſon which perhaps can be given for his vindication, when he ſays, "Fortune made him the executioner of the ſentence, who ought not to have been a ſpectator." By ſaying *fortune made him* ſo, he repreſents it not as a matter of choice, like the other hiſtorians, but of neceſſity, from the nature of his office, which then obliged him to ſee the execution of that ſentence he had himſelf before pronounced; as is the cuſtom at preſent, in ſome popular governments.

The other property, which ſhould often accompany plain and ſimple thoughts, is, that they be gay and ſprightly. This, as has been ſaid, is neceſſary to animate and enliven ſuch diſcourſes as require the low ſtyle. The fewer ornaments it admits of, the greater ſpirit and vivacity is requiſite to prevent its being dry and jejune. A thought may be very briſk and lively, and at the ſame time appear very natural, as the effect of a ready and flowing wit. Such thoughts, attended with agreeable turns, are very ſuitable to this ſtyle; but care ſhould be taken, leſt, while fancy is too much indulged, the juſtneſs of them be overlooked. We ſhall give one inſtance, in which this ſeems to have been the caſe, from a celebrated Engliſh work, where the ingenious writer endeavours to ſhew the diſadvantages of perſons not attending to their natural genius, but affecting to imitate others in thoſe things for which they were not formed. "The great miſfortune (ſays he) of this affectation is, that men not only loſe a good quality, but alſo contract a bad one; they not only are unfit for what they are deſigned, but they aſſign themſelves to what they are unfit for; and inſtead of making a very good figure one way, make a very ridiculous one another. Could the world be reformed to the obedience of that famed dictate, *follow nature*, which the oracle of Delphos pronounced to Cicero when he conſulted what courſe of ſtudies he ſhould purſue, we ſhould ſee almoſt every man as eminent in his proper ſphere as Tully was in his. For my part, I could never conſider this prepoſterous repugnancy to nature any otherwiſe, than not only as the greateſt folly, but alſo one of the moſt heinous crimes; ſince it is a direct oppoſition to the diſpoſition of Providence, and (as Tully expreſſes it) like the ſin of the giants, an actual rebellion againſt heaven." The advantages that ariſe from perſons attending to their own genius, and purſuing its dictates, are here repreſented in a very lively and agreeable manner. But there is one thing aſſerted, which we fear will not hold; which is, that, *Could the world be reformed to that dictate*, "Follow nature," *we ſhould ſee almoſt every man as eminent in his proper ſphere, as Tully was in his*. For though doubtleſs perſons would generally ſucceed beſt, if they kept to this rule; yet different degrees of ability are often found, where the bias and inclination is the ſame, and that accompanied with equal labour and diligence. If this was not ſo, how happened it that no one came up to Tully in the art of oratory; eſpecially in his own age, when there were the greateſt opportunities for that ſtudy, and the higheſt encouragements were given to it, as it paved the way to riches, honours, and all the grand offices of the ſtate? It cannot well be queſtioned, but that there were other gentlemen, who had all the ſame advantages, accompanied with as ſtrong a paſſion for this art, as Tully had, who yet fell much ſhort of him in point of ſucceſs. And experience ſhews, that the caſe has been the ſame in all other purſuits.

102 III. But it is time to proceed to the other head, the *language* proper for this ſtyle. And here it may be obſerved in general, that the dreſs ought to be agreeable to the thoughts, plain, ſimple, and unaffected.

But the firſt thing that comes under conſideration is elegance, or a proper choice of words and expreſſions; which ought always to ſuit the idea they are deſigned to convey. And therefore when an ancient writer, ſpeaking of *cruelty*, calls it *nævus crudelitatis*, the *blemiſh of cruelty*; and another, applying the ſame word to *ingratitude*, ſays *nævus ingratitudinis*, the *blemiſh of ingratitude*; that term does not ſufficiently convey to us the odious nature of either of thoſe vices, as indeed it was not their deſign it ſhould. But otherwiſe, where the ſpeaker has not ſome particular view in doing it, to ſink too low is as much a fault, as to riſe too high. So to call ancient Rome *the miſtreſs of Italy*, would as much leſſen the juſt notion of the extent of her power, as the Roman writers aggrandiſe it when they ſtyle her *miſtreſs of the world*. But purity, both in the choice of words and expreſſions, is never more neceſſary than it is here. This may be called *neatneſs in language*. And to be plain and neat at the ſame time, is not only very conſiſtent but the former can no other way recommend itſelf, than as joined with the latter. Beſides, the fewer advantages any thing has to ſet it off, the more carefully they ought to be obſerved. Perſpicuity is always to be regarded; and ſerves very much to keep up the attention, where other ornaments are wanting. Epithets ſhould be ſparingly uſed, ſince they enlarge the images of things, and contribute very much to heighten the ſtyle. Indeed they are ſometimes neceſſary to ſet a thing in its juſt light; and then they ſhould not be dropped. Thus, in ſpeaking of Xerxes, it would be too low and flat to ſay, *He deſcended with his army into Greece*. Here is no intimation given of their vaſt and unparallelled numbers, which ought to be done. Herodotus ſays, his whole army, of ſea and land forces, amounted to 2,317,000 and upwards. Therefore, unleſs the number be mentioned, the leaſt that can be ſaid is, that *he deſcended with a vaſt army*.

The next thing to be regarded is compoſition, which here does not require the greateſt accuracy and exactneſs. A ſeeming negligence is ſometimes a beauty in this ſtyle, as it appears more natural. Short ſentences, or thoſe of a moderate length, are likewiſe upon the whole beſt ſuited to this character. Long and accurate periods, finely wrought up with a gradual riſe, harmonious numbers, a due proportion of the ſeveral parts, and a juſt cadency, are therefore improper, as they are plainly the effect of art. But yet ſome proportion ſhould be obſerved in the members, that neither the ears be too much defrauded, nor the ſenſe obſcured. Of this kind is that expreſſion of a Greek orator, blamed by Demetrius: *Ceres came readily to our aſſiſtance, but Ariſtides not*. The latter member of this ſentence is too ſhort; and by dropping ſo ſuddenly, both diſappoints the ears, and is ſomewhat obſcure. It would have been plainer, and more agreeable thus, *but Ariſtides did not come*. As to order, the plaineſt and cleareſt diſpoſition, both of the words and members of ſentences, and what is moſt agreeable to the natural conſtruction, beſt ſuits with this character. For one of its principal beauties is perſpicuity. And a proper connection likewiſe of ſentences, with a regular order in the dependence of things one upon another, very much contribute to this end. With regard to the colliſion of ſyllables in different words, for preventing either an hollowneſs or aſperity of ſound, greater liberty may be taken in this ſtyle than in the other characters. Here it may be allowed to ſay, *Virtue is amiable to all, though all do not purſue it*. But in an higher character, perhaps, in order to prevent the hollow ſound of the words *though all*, a perſon would chooſe to vary the expreſſion a little, and ſay, *though few purſue it*. So, *Xerxes' expedition*, may be tolerable here; but in the florid ſtyle, *the expedition of Xerxes* would ſound much better.

The laſt thing thing to be conſidered, with reſpect to the language, is dignity, or the uſe of tropes and figures. And as to tropes, they ought to be uſed cautiouſly; unleſs ſuch as are very common, and by time have either come into the place of proper words, or at leaſt equally plain and clear. So in the inſtance mentioned above, Diodorus Siculus, ſpeaking of the forces of Xerxes, calls them an *innumerable company*. Where, by a *ſynecdoche*, he has choſe to make uſe of an uncertain number for a certain, as leſs liable perhaps to exception. Other examples might be given if neceſſary. And with regard to figures, as moſt of thoſe which conſiſt in words, and are therefore called *verbal figures*, ſerve chiefly to enliven an expreſſion, and give an agreeable turn, they are often not improper for this character. Nor are figures of ſentences wholly to be excluded, eſpecially ſuch as are chiefly uſed in reaſoning or demonſtration. But thoſe which are more peculiarly adapted to touch the paſſions, or paint things in the ſtrongeſt colours, are the more proper ornaments of the higher ſtyles, as will be ſhewn hereafter.

Upon the whole, therefore, pure nature, without any colouring, or appearance of art, is the diſtinguiſhing mark of the low ſtyle. The deſign of it is to make things plain and intelligible, and ſet them in an eaſy light. And therefore the proper ſubjects of it are epiſtles, dialogues, philoſophical diſſertations, or any other diſcourſes, that ought to be treated in a plain and familiar manner, without much ornament, or addreſs to the paſſions. A freedom and eaſe both of thought and expreſſion, attended with an agreeable humour and pleaſantry, are its peculiar beauties that engage us. As we ſee perſons of faſhion and good breeding, though in the plaineſt habit, have yet ſomething in their air and manner of behaviour that is very taking and amiable. Somewhat of the like nature attends this ſtyle. It has its difficulties, which are not ſo eaſily diſcerned, but from experience. For it requires no ſmall ſkill, to treat a common ſubject in ſuch a manner as to make it entertaining. The fewer ornaments it admits of, the greater art is neceſſary to attain this end. Lofty ſubjects often engage and captivate the mind by the ſublimity of the ideas. And the florid ſtyle calls in all the aſſiſtance of language and eloquence. But the plain ſtyle is in a great meaſure ſtripped of thoſe advantages; and has little more to recommend it, than its own native beauty and ſimplicity.

CHAP. VI. *Of the Middle Style.*

103 THIS we ſhall treat in the ſame manner as we did the former, by conſidering firſt the *matter*, and then the *language* proper for it.

104 I. And as the ſubjects proper for this ſtyle are things of weight and importance, which require both a gravity and accuracy of expreſſion; ſo fine thoughts are its diſtinguiſhing mark, as plain thoughts are of the low character, and lofty thoughts of the ſublime. Now a fine thought may deſerve that character from ſome or other of the following properties.

And the firſt property we ſhall mention is gravity and dignity. Thus Cicero in a ſpeech to Cæſar ſays, "It has been often told me, that you have frequently ſaid, you have lived long enough for yourſelf. I believe it, if you either lived, or was born for yourſelf only." Nothing could either be more fit and proper, than this was, when it was ſpoken; or at the ſame time a finer compliment upon Cæſar. For the civil war was now over, and the whole power of the Roman government in the hands of Cæſar; ſo that he might venture to ſay, he had lived long enough for himſelf, there being no higher pitch of glory to which his ambition could aſpire. But then there were many things in the ſtate that wanted redreſſing, after thoſe times of diſorder and confuſion, which he had not yet been able to effect, and of which Cicero here takes an opportunity to remind him. We ſhall produce another example from Curtius. Philotas, one of Alexander's captains, having formed a conſpiracy againſt him, was convicted of it, and put to death. Amintas, who was ſuſpected of the ſame crime, by reaſon of his great intimacy with Philotas, when he comes to make his defence, among other things ſpeaks thus: "I am ſo far from denying my intimacy with Philotas, that I own I courted his friendſhip. Do you wonder that we ſhewed a regard to the ſon of Parmenio, whom you would have to be next to yourſelf, giving him the preference to all your other friends? You, Sir, if I may be allowed to ſpeak the truth, have brought me into this danger. For to whom elſe is it owing, that thoſe who endeavoured to pleaſe you, addreſſed themſelves to Philotas? By his recommendation we have been raiſed to this ſhare of your friendſhip. Such was his intereſt with you, that we courted his favour, and feared his diſpleaſure. Did we not all in a manner engage ourſelves by oath, to have the ſame friends, and the ſame enemies, which you had? Should we have refuſed to take this, which you as it were propoſed to us? Therefore, if this be a crime, you have few innocent perſons about you; nay, indeed none. For all deſired to be the friends of Philotas; though all could not be ſo, who deſired it. Therefore, if you make no difference between his friends and accomplices, neither ought you to make any between thoſe who deſired to be his friends, and thoſe who really were ſo." Could any thing be finer ſpoken, more proper, and becoming the character of a ſoldier, than this defence; eſpecially to a prince of ſo great and generous a ſpirit as Alexander? There is ſomething which appears like this in Tacitus with relation to the emperor Tiberius, but falls vaſtly ſhort of it in the juſtneſs and dignity of the ſentiment. Sejanus, his great favourite, and partner in his crimes, falling under his diſpleaſure, was, like Philotas, put to death for a conſpiracy. Now a Roman knight, who apprehended himſelf in danger on account of his friendſhip with Sejanus, thus apologizes for himſelf to the emperor, in the manner of Amintas: "It is not for us to examine the merit of a perſon whom you raiſe above others, nor your reaſons for doing it. The gods have given you the ſovereign power of all things, to us the glory of obeying. Let conſpiracies formed againſt the ſtate, or the life of the emperor, be puniſhed; but as to friendſhips and private regards, the ſame reaſon that juſtifies you, Cæſar, renders us innocent." The turn of the expreſſions is not much different from that in the caſe of Amintas; but the beauty of the thought is ſpoiled, by the flattery of complimenting Tiberius upon an exceſs of power, which he employed to the deſtruction of many excellent men. There is not that impropriety in the defence of Amintas, which is equally brave and juſt.

Another property of a fine thought is *beauty* and *elegance.* It is a fine compliment which Pliny pays to the emperor Trajan, when he ſays: "It has happened to you alone, that you was father of your country, before you was made ſo." Some of the Roman emperors had been complimented with the title of *father of their country,* who little deſerved it. But Trajan had a long time refuſed it, though he was really ſo, both by his good government, and in the eſteem of his ſubjects, before he thought fit to accept of it. And Pliny, among other inſtances of the generoſity of that prince, which he mentions in the ſame diſcourſe, ſpeaking of the liberty that he gave the Romans to purchaſe eſtates which had belonged to the emperors, and the peaceable poſſeſſion they had of them, does it by a turn of thought no leſs beautiful than the former. "Such (ſays he) is the prince's bounty, ſuch the ſecurity of the times, that he thinks us worthy to enjoy what has been poſſeſſed by emperors; and we are not afraid to be thought ſo." There is a ſpritelineſs in this image, which gives it a beauty; as there is likewiſe in the following paſſage of the ſame diſcourſe, where he ſays to Trajan, "Your life is diſpleaſing to you, if it be not joined with the public ſafety; and you ſuffer us to wiſh you nothing but what is for the good of thoſe who wiſh it." And of the ſame kind is that of Cicero to Cæſar, when he ſays: "You, Cæſar, are wont to forget nothing but injuries." It is a very handſome, as well as juſt reflection, made by Tacitus upon Galba's government, that, "He ſeemed too great for a private man, while he was but a private man; and all would have thought him worthy of the empire, had he never beeen emperor." The beauty of a thought may give us delight, though the ſubject be ſorrowful; and the images of things in themſelves unpleaſant, may be ſo repreſented as to become agreeable. Siſigambis, the mother of Darius, after the death of her ſon, had been treated by Alexander with the greateſt regard and tenderneſs, in whoſe power ſhe then was. So ſoon as ſhe heard therefore that he was dead, ſhe grew weary of life, and could not bear to outlive him. Upon which Q. Curtius makes this fine reflection: "Though ſhe had courage to ſurvive Darius, yet ſhe was aſhamed to outlive Alexander."

The next property of a fine thought, which we ſhall mention, is *delicacy*. As, in the objects of our ſenſes, thoſe things are ſaid to be delicate which affect us gradually in a ſoft and agreeable manner; ſo a delicate thought is that which is not wholly diſcovered at once, but by degrees opening and unfolding itſelf to the mind, diſcloſes more than was at firſt perceived. Quintilian ſeems to refer to this, when he ſays, "Thoſe things are grateful to the hearers, which when they apprehend, they are delighted with their own ſagacity; and pleaſe themſelves, as though they had not heard, but diſcovered them." Such thoughts are not unlike the ſketches of ſome pictures, which let us into the deſign of the artiſt, and help us to diſcern more than the lines themſelves expreſs. Of this kind is that of Salluſt: "In the greateſt fortunes, there is the leaſt liberty." This is not often ſo in fact, but ought to be; both to guard againſt an abuſe of power, and to prevent the effects of a bad example to inferiors. Pliny, ſpeaking of the emperor Trajan's entry into Rome, ſays: "Some declared, upon ſeeing you, they had lived long enough; others, that now they were more deſirous to live." The compliment is fine either way, ſince both muſt eſteem the ſight of him the greateſt happineſs in life; and in that conſiſtency lies the delicacy of the thought. It was a fine character given of Grotius, when very young, on the account of his ſurpriſing genius and uncommon proficiency in learning, that *he was born a man*: As if nature, at his coming into the world, had at once furniſhed him with thoſe endowments which others gradually acquire by ſtudy and application.

The laſt property of a fine thought, which we ſhall take notice of, is *novelty*. Mankind is naturally pleaſed with new things; and when at the ſame time they are ſet in an agreeable light, this very much heightens the pleaſure. Indeed there are few ſubjects, but what have been ſo often conſidered, that it is not to be expected they ſhould afford many thoughts entirely new; but the ſame thought ſet in a different light, or applied to a different occaſion, has in ſome degree a claim of novelty. And even where a thing hath been ſo well ſaid already, that it cannot eaſily be mended, the revival of a fine thought often affords a pleaſure and entertainment to the mind, though it can have no longer the claim of novelty. Cicero, in his treatiſe of an orator, among ſeveral other encomiums which he there gives to Craſſus, ſays of him: "Craſſus always excelled every other perſon, but that day he excelled himſelf." He means as an orator. But elſewhere he applies the ſame thought to Cæſar, upon another account; and with ſome addition to it. "You had (ſays he) before conquered all other conquerors by your equity and clemency, but to-day you have conquered yourſelf; you ſeem to have vanquiſhed even victory herſelf, therefore you alone are truly invincible." This thought, with a little variation of the phraſe, has ſince appeared in ſeveral later writers; and it is now grown common to ſay of a perſon, who excells in any way, upon his doing better than he did before, that he has outdone himſelf. The like has happened to another thought, which, with a little alteration, has been variouſly applied. It was ſaid by Varro, *That if the Muſes were to talk Latin, they would talk like Plautus.* The younger Pliny, applying this compliment to a friend of his, ſays, *His letters are ſo finely written, that you would think the Muſes themſelves talked Latin.* And Cicero tells us, *It was ſaid of Xenophon, that the Muſes themſelves ſeemed to ſpeak Greek with his voice.* And elſewhere, that *Philoſophers ſay, if Jupiter ſpeaks Greek, he muſt ſpeak like Plato.* The thought is much the ſame in all theſe inſtances, and has been ſince revived by ſome modern writers.

II. We ſhall now conſider the *language* proper for the middle ſtyle. 105 And in general it may be obſerved, that as the proper ſubjects of it are things of weight and importance, though not of that exalted nature as wholly to captivate the mind and divert it from attending to the diction; ſo all the ornaments of ſpeech, and beauties of eloquence, have place here.

And firſt with regard to elegance, it is plain that a different choice of words makes a very great difference in the ſtyle, where the ſenſe is the ſame. Sometimes one ſingle word adds a grace and weight to an expreſſion, which, if removed, the ſenſe becomes flat and lifeleſs. Now ſuch words as are moſt full and expreſſive, ſuit beſt with this character. Epithets alſo, which are proper and well choſen, ſerve very much to beautify and enliven it, as they enlarge the ideas of things, and ſet them in a fuller light.

The moſt accurate compoſition, in all the parts of it, has place here. Periods, the moſt beautiful and harmonious, of a due length, and wrought up with the moſt exact order, juſt cadency, eaſy and ſmooth connection of the words, and flowing numbers, are the genuine ornaments, which greatly contribute to form this character.

But the principal diſtinction of ſtyle ariſes from tropes and figures. By theſe it is chiefly animated and raiſed to its different degrees or characters, as it receives a leſſer or greater number of them; and thoſe either more mild, or ſtrong and powerful.

As to tropes, thoſe which afford the moſt lively and pleaſing ideas, eſpecially metaphors, ſuit the middle character. It is a pretty remark, which has been made by ſome critics upon two verſes of Virgil; one in his Eclogues, and the other in his Georgics. The former of theſe works is for the moſt part written in the low ſtyle, as the language of ſhepherds ought to be; but the latter in the middle ſtyle, ſuitable to the nature of the ſubject, and the perſons for whom it was deſigned, the greateſt men in Rome not thinking it below them to entertain themſelves with rural affairs. Now in the Eclogue, as ſome copies read the verſe, the ſhepherd, complaining of the barrenneſs of his land, ſays:

Infelix lolium et ſteriles naſcuntur avenæ.

In Engliſh thus:

Wild oats and darnel grow inſtead of corn.

But in the Georgic, where the ſame ſenſe is intended, inſtead of the proper word *naſcuntur*, *grow*, the author ſubſtitutes a metaphor, *dominantur*, *command*, and ſays:

Infelix lolium et ſteriles dominantur avenæ.

That is in Engliſh:

Where corn is ſown, darnel and oats command.

It was fit and natural for the ſhepherd to expreſs his ſenſe in the plaineſt terms; and it would have been wrong to repreſent him going ſo far out of his way, as to fetch a metaphor from government, in talking upon his own affairs. But in the Georgic, where the poet ſpeaks in his own perſon, the metaphor is much more beautiful, and agreeable to the dignity of the work. This inſtance may ſhew in ſome meaſure how the ſtyle is heightened by tropes, and the ſame thought may be accommodated to the ſeveral characters of ſtyle by the different manner of expreſſion.

105 The like may alſo be ſaid of figures either of words or ſentences, in reference to this character; which admits of the fineſt deſcriptions, moſt lively images, and brighteſt figures, that ſerve either for delight, or to influence the paſſions without tranſport or ecſtaſy, which is the property of the ſublime. This is indeed the proper ſeat of ſuch embelliſhments, which ſupport and make up a principal part of the middle or florid ſtyle. Having treated largely upon theſe in ſeveral preceding chapters, we ſhall here only briefly mention ſome of the moſt conſiderable.

106 *Deſcriptions* are not only a great ornament to a diſcourſe, but repreſent things in a very lively and agreeable manner. In what a beautiful light has Cicero placed the polite arts and ſciences, when, deſcribing them from their effects, he thus repreſents to us the great advantages, as well as pleaſure, which they afford to the mind? "Other ſtudies neither ſuit with all times, nor all ages, nor all places: but theſe improve youth, delight old age, adorn proſperity, afford a refuge and ſolace in adverſity; pleaſe at home, are no hindrance abroad; ſleep, travel, and retire with us." And they often affect us very powerfully, when they are addreſſed to the ſenſes. Quintilian has painted the calamities of a city taken by ſtorm in the brighteſt and ſtrongeſt colours, which he repreſents by "Flames ſpreading themſelves over the houſes and temples, the cracking of falling buildings, and a confuſed noiſe from a variety of cries and ſhouts; ſome running they know not where, others in the laſt embraces of their friends, the ſhrieks of children, women, and old men unhappily reſerved to ſuch diſtreſs; the plundering of all places civil and ſacred, the hurry and confuſion in carrying off the booty, captives driven before their victors, mothers endeavouring to guard their infants, and quarrels among the conquerors where the plunder is largeſt." This ſeems to be a very natural, as well as moving, image of ſo dreadful a calamity.

107 *Proſopopeia* is another very ſtrong and beautiful figure, very proper for this character. Seneca has a fine inſtance of it in his *Conſolotary letter to Marcia*, upon the death of her ſon. After many arguments he had made uſe of to alleviate her grief, he at laſt introduces her father, Cremutius Cordus, as thus addreſſing to her: "Imagine your father (ſays he) from the celeſtial regions, ſpeaking to you in this manner: Daughter, why do you ſo long indulge your grief? why are you ſo ignorant, as to think it unhappy for your ſon, that, weary of life, he has withdrawn himſelf to his anceſtors? Are you not ſenſible what diſorders fortune occaſions every where? and that ſhe is kindeſt to thoſe who have leaſt concern with her? Need I mention to you princes who had been extremely happy had a more timely death ſecured them from impending evils? or Roman generals, who wanted nothing to conſummate their glory, but that they lived too long? Why then is he bewailed longeſt in our family, who died moſt happily? There is nothing, as you imagine, deſirable among you, nothing great, nothing noble; but, on the contrary, all things are mean, full of trouble and anxiety, and partake very little of the light which we enjoy." This advice was very ſuitable for a philoſopher; and he ſeems to have choſen this way of introducing it, to enforce the argument drawn from the happineſs of good men in a future ſtate, from the teſtimony of a perſon who was actually in the poſſeſſion of it.

108 *Similitudes* and compariſons are another great ornament of this ſtyle, and ofteneſt found here. Nothing can be finer than the compariſon between thoſe two great orators, Demoſthenes and Cicero, made by Quintilian, when he ſays: "Demoſthenes and Cicero differ in their elocution; one is more cloſe, and the other more copious; the former concludes more conciſely,

ciſely, and the latter takes a larger compaſs; the one always with pungency, and the other generally with weight; one can have nothing taken from him, and the other nothing added to him; the latter has more of art, and the former more of nature. But this muſt be allowed to Demoſthenes, that he made Cicero in a great meaſure what he was. For as Tully gave himſelf wholly to an imitation of the Greeks, he ſeems to me to have expreſſed the force of Demoſthenes, the fluency of Plato, and the pleaſantry of Iſocrates." Similitudes, taken from natural things, ſerve very much to enliven the ſtyle, and give it a cheerfulneſs; which is a thing ſo common and well known, that we need not ſtay to give any inſtances of it.

109 *Antitheſis*, or oppoſition, both in the words and ſenſe, has often the like beautiful effect. There is an agreeable contraſt in that paſſage of Seneca: "Cæſar does not allow himſelf many things, becauſe he can do all things: his watching defends all others ſleep, his labour their quiet, his induſtry their pleaſure, his buſineſs their eaſe; ſince he has governed the world, he has deprived himſelf of it." Had he ſaid no more than only in general, that, *Cæſar does not allow himſelf many things, becauſe he can do all things*, it might have paſſed for a fine thought; but, by adding ſo many particulars, all in the ſame form of expreſſion, and beginning each member with the ſame word, he has both enlarged the idea, and beautified the antitheſis, by a bright verbal figure.

Theſe, and ſuch like florid figures, are ſometimes found in hiſtorians, but oftener in orators; and indeed this middle character, in the whole of it, is beſt accommodated to the ſubjects of hiſtory and oratory.

Chap. VII. *Of the Sublime Style.*

110 The *ſublime* is the moſt noble, as well as the moſt difficult part, of an orator's province. It is this principally which Cicero requires in his perfect orator, whom he could not deſcribe in words, but only conceive of in his mind. And indeed, the nobleſt genius and greateſt art are both requiſite to form this character. For where nature has been moſt liberal in furniſhing the mind with lofty thoughts, bright images, and ſtrong expreſſions; yet without the aſſiſtance of art there will ſometimes be found a mixture of what is low, improper, or miſplaced. And a great genius, like a too rich ſoil, muſt produce flowers and weeds promiſcuouſly, without cultivation. But the juſteſt propriety, joined with the greateſt ſtrength and higheſt elevation of thought, are required to complete the true ſublime. Art therefore is neceſſary to regulate and perfect the taſte of thoſe who are deſirous to excell in this character.

In explaining the nature and properties of this character, we ſhall, as in the two former, conſider firſt the *thoughts*, and then the *language*, in each of which it is diſtinguiſhed from them.

§ 1. *Sublime, as it relates to Thoughts.*

111 Lofty and grand ſentiments are the baſis and foundation of the true ſublime. Longinus therefore adviſes thoſe who aſpire at this excellence, to accuſtom themſelves to think upon the nobleſt ſubjects. A mind that always dwells upon low and common ſubjects, can never raiſe itſelf ſufficiently to repreſent things great and magnificent in their full extent and proper light. But he who inures himſelf to conceive the higheſt and moſt exalted ideas, and renders them familiar to his thoughts, will not often be at a loſs how to expreſs them; for where proper words are wanting, by metaphors and images taken from other things he will be able to convey them in a juſt and adequate manner. What is more common than for two perſons to conceive very differently of the ſame thing from the different manner of thinking to which they have been accuſtomed? After the great battle in Cilicia, between Alexander and Darius, in which the latter was routed, he ſent ambaſſadors to Alexander with propoſals of peace, offering him half his kingdom with his daughter in marriage. Parmenio, one of Alexander's chief captains, ſays to him upon this occaſion: "For my part, was I Alexander, I would accept of theſe conditions." "And ſo would I," replies that aſpiring monarch, "was I Parmenio." The half of ſo vaſt a kingdom at preſent, and a right of ſucceſſion to the whole by marriage, was the higheſt ambition to which the thoughts of Parmenio could riſe. But Alexander had vaſtly higher views, he aimed at nothing leſs than univerſal monarchy; and therefore ſuch a propoſal ſeemed much beneath his regard. Noble and lofty thoughts are principally thoſe which either relate to divine objects, or ſuch things as among men are generally eſteemed the greateſt and moſt illuſtrious.

Of the former ſort is that of Homer, when deſcribing the goddeſs Diſcord, he ſays, that ſhe

> Walks on the ground, and hides her head in clouds.

This ſtretch of thought, ſays Longinus, as great as the diſtance between heaven and earth, does not more repreſent the ſtature of the goddeſs, than the meaſure of the poet's genius and capacity. But ſuch images, however beautiful in poetry, are not ſo proper for an orator, whoſe buſineſs it is to make choice of thoſe which are ſuited to the nature of things and the common reaſon of mankind. When Numa the ſecond king of Rome was ſettled in his government, and at peace with his neighbours, in order to ſoften the fierce and martial temper of his ſubjects, who had been always accuſtomed to wars during the reign of his predeceſſor Romulus, he endeavoured to impreſs their minds with an awe of the Deity; and for that end introduced a number of religious ceremonies, which he pretended to have received from the goddeſs Egeria. This muſt be eſteemed an artful piece of policy at that time. But that ſentiment is far more juſt and noble, with which Cicero endeavours to inſpire the members of a community, in his treatiſe Of Laws, when he ſays, that "Citizens ought firſt to be perſuaded, that all things are under the rule and government of the gods; that every affair is directed by their wiſdom and power; that the higheſt regard is due to them from men, ſince they obſerve every one's conduct, how he acts and behaves himſelf, and with what temper and devotion he worſhips them; and that they make a difference between the pious and impious." Perſons under the influence of ſuch a perſuaſion, could not fail of behaving well in ſociety. And what he ſays to Cæſar is no leſs in this ſtyle, when, interceding for Ligarius, he tells him, that "men in nothing approach nearer to deity, than in giving life to men." And Velleius Paterculus, ſpeaking of Cato, gives him this ſublime character, "That he was more like the gods than men; who never did a good thing, that he might ſeem to do it."

The other kind of lofty thoughts mentioned above, are thoſe which relate to power, wiſdom, courage, beneficence, and ſuch other things as are of the higheſt eſteem among mankind. "Your fortune (ſays Tully to Cæſar) has nothing greater than a power, nor your nature than a will, to ſave many." He ſubjoins this compliment to what we juſt now cited from him; and applies that to Cæſar, which was before only expreſſed in general, leaving him to draw the inference of his ſimilitude to deity from the clemency of his nature. And elſewhere, as in a ſort of tranſport for his ſucceſs in defeating the conſpiracy of Catiline, he thus beſpeaks the Roman ſenate: "You have always decreed public thanks to others for their good government of the ſtate, but to me alone for its preſervation. Let that Scipio ſhine, by whoſe conduct and valour Hannibal was forced to leave Italy, and retire to Africa; let the other Scipio be greatly honoured, who deſtroyed Carthage and Numantia, two cities the moſt dangerous to this empire; let Lucius Paulus be in high eſteem, whoſe triumphal chariot was adorned with Perſes, once a moſt powerful and noble prince; let Marius be in eternal hunour, who twice delivered Italy from an invaſion and the dread of ſervitude; let Pompey's name excel all theſe, whoſe actions and virtues are terminated by no other bounds but the courſe of the ſun: yet, among all their praiſes, there will ſtill ſome place be left for my glory; unleſs indeed it be a greater thing to open for us new provinces to which we may reſort, than to ſecure a place for our victorious generals to return in triumph." And Velleius Paterculus, as if he thought no encomium too high for this great orator, laments his unhappy fate in theſe lofty ſtrains, addreſſed to M. Antony, by whoſe order he was put to death: "You have taken from Cicero old age, and a life more miſerable than death under your government; but his fame, and the glory of his actions and words, you have been ſo far from deſtroying, that you have increaſed them. He lives, and will live in the memory of all ages; and while this ſyſtem of nature, however conſtituted, ſhall remain, (which ſcarce any Roman but himſelf conceived in his mind, comprehended by his genius, and illuſtrated with his eloquence), the praiſe of Cicero ſhall accompany it; and all poſterity, while it admires his writings againſt you, will curſe your treatment of him; and ſooner ſhall mankind be loſt to the world, than his name." It was a noble reply of Porus the Indian king, when, after his defeat by Alexander, being brought before him, and aſked, *How he expected to be treated?* he anſwered, *Like a king.* And Valerius Maximus, ſpeaking of Pompey's treatment of Tigranes king of Armenia after he had vanquiſhed him, expreſſes it in a manner ſuited to the dignity and beneficence of the action, when he ſays, "He reſtored him to his former fortune, eſteeming it as glorious to make kings, as to conquer them."

But the true ſublime is conſiſtent with the greateſt plainneſs and ſimplicity of expreſſion. And, generally ſpeaking, the more plain and natural the images appear, the more they ſurpriſe us. How ſuccinct, and yet how majeſtic, is that expreſſion of Cæſar upon his victory over Pharnaces? *I came, I ſaw, I conquered.* But there cannot be a greater or more beautiful example of this, than what Longinus has taken notice of from Moſes. "The legiſlator of the Jews (ſays he), no ordinary perſon, having a juſt notion of the power and majeſty of the Deity, has expreſſed it in the beginning of his laws in the following words: *And God ſaid*—what? *Let there be light; and there was light. Let the earth be made; and it was made.*" This inſtance from the divine writer, and the character here given of him by that excellent critic, is the more remarkable, as he was himſelf a Pagan. And certainly no laboured deſcription could raiſe in the mind an higher conception of the infinite power of the Deity, than this plain and ſhort narration. To command nature itſelf into being by a *word*, repreſents it at once altogether boundleſs and unlimited.

It ſometimes very much contributes to heighten the image of a thing, when it is expreſſed in ſo undetermined a manner, as to leave the mind in ſuſpence what bounds to fix to the thought. Of this kind is that of Cicero, when he firſt raiſes an objection againſt the neceſſity of an acquaintance with polite literature in order to form a great man, and then anſwers it. The objection is founded upon the examples of ſeveral great and excellent perſons among the Romans, who had raiſed themſelves to the higheſt pitch of honour and dignity, and been very ſerviceable to their country, by the help of a good genius, without the advantage of much learning. In reply to which, he allows, that, where theſe are not united, nature or genius is of itſelf much preferable, and will carry a perſon further in the purſuit of great and noble deſigns, than learning without a genius; but that both are neceſſary to complete and perfect a truly great man. But we ſhall give what he ſays himſelf on this this head, by which that property of a ſublime thought we are now endeavouring to explain, will appear from his manner of expreſſion: "I acknowledge (ſays he) that many perſons of an exalted mind and virtue have, from a divine temper, without inſtruction, become moderate and grave; and I add likewiſe, that nature, without the aſſiſtance of learning, has frequently more contributed to honour and virtue, than learning where a genius has been wanting: But yet I muſt ſay, that where the direction and improvement of learning is added to a great and excellent genius, it is wont to produce ſomething admirable and ſingular, which I know not how to deſcribe." He knew very well, that, by leaving the minds of his hearers thus in ſuſpence, they would form to themſelves higher conceptions of what he intended, than from any idea he could convey to them in words. We may add to this another example from the ſame great orator, where he ſays, "Truly, if the mind had no views to poſterity, and all its thoughts were terminated by thoſe bounds in which the ſpace of life is confined, it would neither fatigue itſelf with ſo great labours, nor be diſquieted with ſo many cares and watchings, nor ſo often expoſe itſelf to death. But there is a certain active principle in every good man, which conſtantly excites his mind by motives of glory; and reminds him, that the remembrance of his name is not to end with his life, but extend itſelf to all poſterity." Of the like nature is that of Milton, when he deſcribes Satan as flying from hell in queſt of our earth, then newly formed. For, having repreſented that his wings failed him in the vaſt vacuity, he thus deſcribes his fall:

> Down he drops
> Ten thouſand fathom deep; and to this hour
> Down had been falling, had not by ill chance
> The ſtrong rebuff of ſome tumultuous cloud,
> Inſtinct with fire and nitre, hurried him
> As many miles aloft.

Thoſe words, by which his fall is expreſſed,

> And to this hour
> Down had been falling,

leave the mind in ſuſpence, and unable to fix any bounds to the vacuity; and by that means raiſe a greater and more ſurpriſing idea of its ſpace, than any direct expreſſion could have done. This image is very beautiful where it ſtands; but ſo much out of the common way of thinking, as to ſuit better with an epic poem, than the diſcourſe of an orator.

§ 2. *The Sublime, with regard to Language.*

112 WHAT we have to offer upon this ſubject, will come under the three heads of *Elegance*, *Compoſition*, and *Dignity*; which comprehend all the properites of ſtyle.

113 I. *Elegance.* Thoſe words and expreſſions chiefly contribute to form the ſublime, which are moſt ſonorous, and have the greateſt ſplendor, force, and dignity. And they are principally ſuch as theſe. Long words, when equally expreſſive, are rather to be choſen, than ſhort ones, and eſpecially monoſyllables. So to conquer or vanquiſh and enemy, carries in it a fuller and and more grand ſound, than to beat an enemy. For which reaſon, likewiſe, compound words are often preferable to ſimple ones. So if we ſay, *Cæſar's army, when he was preſent, was always invincible;* this manner of expreſſion has more of ſublimity in it, than ſhould we ſay, *Cæſar's army, when he was preſent, could never be conquered.* But the ancient languages have much the advantage of ours in both theſe reſpects; for their words are generally longer, and they are abundantly more happy in their compoſitions. The uſe of proper epithets does alſo in a particular manner contribute to this character. For as they denote the qualities and modes of things, they are, as it were, ſhort deſcriptions; ſo that being joined to their ſubjects, they often greatly enlarge and heighten their image. Thus when the character of *divine poet* is given to Homer or Virgil, or *prince of orators* to Demoſthenes or Cicero; it conveys to the mind a more ſublime idea of them, than the bare mention of their name.

114 II. *Compoſition:* The force of which, as Longinus obſerves, is ſo great, that ſometimes it creates a kind of ſublime where the thoughts themſelves are but mean, and gives a certain appearance of grandeur to that which otherwiſe would ſeem but common. But compoſition conſiſts of ſeveral parts; the firſt of which, in the order we have hitherto conſidered them, is *period.* And here the caſe is much the ſame as with animal bodies, which owe their chief excellency to the union and juſt proportion of their parts. The ſeveral members, when ſeparate from each other, loſe both that beauty and force, which they have when joined together in a complete body. In like manner ſublimity ariſes from the ſeveral parts of a period ſo connected, as to give force, as well as beauty, to the whole. The periods therefore in this character ſhould be of a proper length. If they are too ſhort, they loſe their juſt weight and grandeur, and are gone almoſt before they reach the ear; as on the contrary, when they are too prolix, they become heavy and unwieldy, and by that means loſe their force. But more eſpecially, nothing ſuperfluous ought to be admitted, which very much enervates the force of a ſentence. We ſhall exemplify this in a paſſage from Herodotus, where he is giving an account of the famous battle at Thermopylæ, between the Perſians and Lacedemonians. "Dieneces," ſays he, "the Spartan, being told by a Trachinian, before the engagement with the Medes, that when the barbarians came to ſhoot their arrows, they would fly ſo thick as to obſcure the light of the ſun; he was ſo far from being terrified at this, that, deſpiſing their number, he replied, he "was pleaſed with what his friend told him, ſince if the ſun was obſcured, they ſhould fight in the ſhade, and not in the ſun." The ſenſe here is great and noble, but the ſublimity of expreſſion is ſpoilt in a great meaſure by thoſe laſt words, *and not in the ſun,* which are wholly ſuperfluous. Cicero was ſenſible of this, and therefore he omits that member in relating the ſame ſtory, and ſays only: "A Spartan, hearing that one of the Perſians ſhould ſay in an inſulting manner, that when they came to engage, they ſhould not be able ſo ſee the ſun, for the multitude of their darts and arrows, replies, Then we ſhall fight in the ſhade." By ſtopping here, he gives the ſentence much more life and emphaſis. The next thing to be conſidered in compoſition, is the order and diſpoſition of the ſeveral words and members of a ſentence. The different placing but of one or two words will ſometimes wholly deſtroy the grandeur of a ſentence, and make it extremely flat. "This public act (ſays Demoſthenes) diſpelled the danger, which at that time, like a cloud, hung over the city." Let us vary the order a little, and read it thus: "This public act diſpelled the danger, which like a cloud hung over the city at that time." What a different turn does the expreſſion receive for the worſe! The ſpirit and majeſty of it are entirely loſt.—And in placing the ſeveral parts or members, they ought to be ſo diſpoſed, that what is moſt weighty and important ſhould ſtand laſt. So Tully ſays of Catiline: "We ought to return thanks to heaven, that we have ſo often eſcaped ſo odious, ſo frightful, ſo dangerous a plague of the ſtate." A thing may be odious, and frightful, and yet not dangerous; therefore he puts this in the laſt place, to give it the greater force, and make the deepeſt impreſſion. Another thing to be attended to in compoſition, is the connection of the words with regard to the ſound; that the pronunciation, in paſſing from one to another, may be moſt agreeable to the ear, and beſt ſuited to the nature of the ſubject. And as this is generally ſomething grand and magnificent, ſuch a contexture of them as will give the greateſt force and energy to the expreſſion is moſt proper for the ſublime. Soft and languid ſounds are very unſuitable to this character. They ſoothe and pleaſe the ear; but

rather ſink and depreſs the mind, than excite it to things great and noble. In this reſpect therefore, our tongue, by its multitude of conſonants, is more ſuitable for ſublime diſcourſes, than ſome other modern languages, which abound with vowels.

115 III. The laſt head to be conſidered, is the proper uſe of tropes and figures; which is here ſo neceſſary, that the title of *dignity* ſeems to have been given to this part of elocution, from the aſſiſtance it more eſpecially affords to this character. For if, as has been obſerved from Longinus, compoſitions will ſometimes create a ſort of ſublimity; this much oftener happens from the force and efficacy of ſome lively tropes and ſtrong figures.

And as to *tropes*, bright metaphors are peculiarly ſuited to raiſe and animate the ſtyle. This is manifeſt from the nature of them, as they conſiſt of contracted ſimilies, reduced to a ſingle word; which, if taken from things lofty and grand, muſt of conſequence give a ſublimity to the ſtyle. What can ſuggeſt to us a greater idea of the valour of Ajax, than Homer's calling him *the bulwark of the Greeks*; or of the Scipios, than when they are ſtyled by Virgil, *the two thunderbolts of war*. A number of thoſe, well choſen, contribute no leſs to the grandeur than to the beauty of diſcourſe. Hyperbole ſometimes gives the ſame force to an expreſſion, if cautiouſly uſed, and ſo as not to exceed all appearance of truth. But the chief uſe of it is, where proper words will not expreſs the juſt idea of the thing deſigned to be conveyed; and it may ſeem rather the offspring of neceſſity than choice. Of this nature is that of Herodotus, when ſpeaking of the Lacedemonians at Thermopylæ, he ſays: "They defended themſelves with the ſwords they had left, and even with their hands and teeth, till the barbarians buried them under their arrows." It cannot be ſuppoſed ſtrictly true, that ſo many arrows were thrown at them as to bury them; but having in the former part of the ſentence repreſented their reſolute defence in the ſtrongeſt terms, by ſaying, that, naked and without arms, they engaged armed men with their hands and teeth, the following hyperbole ſeems not unnatural, and to intimate nothing more than what was neceſſary to quell ſuch obſtinate reſolution and courage.

As to *figures*, whether verbal or thoſe which conſiſt in the ſenſe, the nature of this character will eaſily direct to ſuch as are moſt proper. But with reſpect to the latter, poets take greater liberties in the uſe of them than would be allowed in an orator. As their images are often formed for pleaſure and delight, ſo they carry in them more of rapture and tranſport. But the orator's uſe of them being to ſet things in a ſtronger and clearer light, they are more ſedate and moderate. Beſides, an orator ſcarce ever has occaſion for ſuch fictitious images as we often meet with in poetry; though his ought to appear as natural, and its painting as ſtrong and lively. We ſhall juſt mention ſome of the chief of thoſe figures, which ſeem beſt ſuited for this purpoſe; though they are no leſs ſuited to the middle ſtyle, as has been ſhewn already, when taken from ſubjects of an inferior nature.

116 1. *Deſcription.* Of this Juſtin gives us a fine inſtance, in a ſpeech of king Philip the fifth of Macedon, wherein he repreſents the neceſſity of falling upon the Romans, who at that time were engaged in a war with Hannibal. "I behold," ſays he, "a cloud of a moſt dreadful and bloody war riſing in Italy. I ſee a ſtorm of thunder and lightning from the weſt, which will overſpread all places with a vaſt ſhower of blood, into whatever country the tempeſt of victory ſhall drive it. Greece has undergone many violent ſhocks in the Perſian, Gallic, and Macedonian wars; but theſe would all be found unworthy of regard, if the armies now engaged in Italy ſhould march out of that country. I view the terrible and cruel wars which involve thoſe nations through the courage of their forces, and ſkill of their generals. This rage and fury cannot ceaſe by the deſtruction of one party, without the ruin of their neighbours. Indeed, Macedon has leſs reaſon to dread the ſavage conquerors, than Greece; becauſe more prepared, and better able to defend itſelf: but I am ſenſible, thoſe who attack each other ſo impetuouſly, will not confine their victories within thoſe bounds; and that it will be our lot to engage the conquerors." So lively a picture of imminent and threatning danger, muſt needs alarm the moſt timorous, and excite them to a reſolution to defend their country, and all that was dear to them. Such images give life and vigour to a diſcourſe, and being artfully interwoven with proper arguments, influence the mind, and carry it away by an irreſiſtible force; ſo that the hearer is not barely left to conclude the certainty of the thing, but moved by it, as it were, from ocular demonſtration. The images therefore of the orator ought to be drawn from real things, or at leaſt ſuch as are probable; for if they are wholly fictitious and incredible, as many poetical images are, they may give pleaſure, but will not convince the mind, nor ſway the paſſions.

117 2. *Enumeration* has ſome affinity with the former figure; by which, if the ſeveral parts have each ſomething grand in them, the whole, when brought together, and diſpoſed in a juſt order, very much contributes to the ſublimity. We ſhall produce an example of this from an Engliſh writer, containing a deſcription of our globe, upon a ſurvey of it after the general conflagration, which he repreſents in this ſtrong light: "Such is the vanity and tranſient glory of this habitable world! By the force of one element breaking looſe upon the reſt, all the vanities of nature, all the works of art, all the labours of man, are reduced to nothing; all that we admired and loved before, as great and magnificent, is obliterated and vaniſhed, and another form and face of things, plain, ſimple, and every where the ſame, overſpreads the whole earth. Where are now the great empires of the world, and their great imperial cities? their pillars, trophies, and monuments of glory? Shew me where they ſtood, read the inſcription, tell me the victor's name. What remains, what impreſſions, what difference or diſtinction, do you ſee in this maſs of fire? Rome itſelf, eternal Rome, the great city, the empreſs of the world, whoſe domination or ſuperſtition, ancient or modern, make a great part of the hiſtory of the earth; what is become of her now? She laid her foundations deep, and her palaces were ſtrong and ſumptuous; *ſhe glorified herſelf, and lived deliciouſly, and ſaid in her heart, I ſit a queen, and ſhall ſee no ſorrow*: but her hour is come, ſhe is wiped away from the face

of the earth, and buried in everlaſting oblivion. But it is not cities only, and the works of mens hands; the everlaſting hills, the mountains and rocks of the earth, are melted as wax before the ſun, *and their place is no where found*. Here ſtood the Alps, the load of the earth, that covered many countries, and reached their arms from the ocean to the Black ſea. This huge maſs of ſtone is ſoftened and diſſolved, as a tender cloud into rain. Here ſtood the African mountains, and Atlas with his top above the clouds. There was frozen Caucaſus, and Taurus, and Imaus, and the mountains of Aſia; and yonder, towards the north, ſtood the Riphean hills, clothed in ice and ſnow; all theſe are vaniſhed, dropped away, as the ſnow upon their heads †." Theſe particulars conſidered ſeparately, are all truly great and noble, and every way ſuited to the nature of the ſubject; but as they are here diſpoſed, and riſe in order, they both enlarge the idea, and heighten the image of that grand cataſtrophe.

118 3. *Similitude:* Which ſerves very much for beauty and ornament; and when taken from great and ſublime objects, adds a grandeur and magnificence to the things illuſtrated by it. We need go no farther for an example of this, than to the great critic ſo often mentioned already, who has treated upon the ſublime in a ſtyle every way equal to the ſubject. He, then, comparing thoſe two great works of Homer, his Iliad and Odyſſey, thus deſcribes them: "Homer compoſed his Iliad, when his mind was in its full ſtrength and vigour; the whoſe body of the poem is dramatic, and full of action: whereas the beſt part of the Odyſſey is taken up in narrations, which ſeem to be the genius of old age. So that one may compare him in this latter work to the ſetting ſun, which ſtill appears with the ſame magnificence, but has no longer the ſame heat and force." And ſoon after, ſpeaking of the Odyſſey, he ſays, "That piece may be called the reflux of his genius, which like the ocean ebbs, and deſerts its ſhores." What nobler idea could poſſibly have been given of that great poet, than by thoſe two ſimilitudes of the ſun and the ocean? And elſewhere, comparing thoſe two great orators Demoſthenes and Cicero, he ſhews the like ſublimity of thought. Demoſtenes, ſays he, "is ſublime, in that he is cloſe and conciſe; Cicero, in that he is diffuſed and extenſive. The former, by reaſon of the violence, rapidity, ſtrength, and fury, with which he rages and bears all before him, may be compared to a tempeſt and thunder; but the latter, like a great conflagration, devours and conſumes all he meets, with a fire that is never extinguſhed, but wherever it advances continually gathers new ſtrengh."

119 4. *Antitheſis*, or a ſentence conſiſting of oppoſite parts, has often the ſame effect; as in the following inſtance of Cicero, where his view is to repreſent Pompey as a moſt conſummate general. "Who," ſays he, "ever was, or need be more knowing, than this man? who from his childhood, and inſtruction at ſchool, went into the army of his father, and learned the military art, in a very great war againſt the fierceſt enemies: who while yet a boy, became a ſoldier under the greateſt general; and when firſt a youth, was himſelf commander of a very great army: who has oftener engaged with the enemy in battle, than any other perſon with his adverſary in private conteſts; has waged more wars than others have read, and conquered more provinces than others have wiſhed to govern: whoſe youth has been ſpent in acquiring the art of war, not by the precepts of others, but his own commands; not by defeats, but victories; not by campains, but triumphs."

120 5. *Apoſtrophe.* Among the articles charged againſt Demoſthenes by his great adverſary and rival Æſchines, one was, that he had adviſed the Athenians to engage in a war againſt king Philip, wherein they had received a very great defeat. When he comes to anſwer that part of the charge, he does not ſay, as he might, "You have not been miſled, my fellow-citizens, in expoſing your lives for the liberties and ſafety of Greece; you are not without the moſt illuſtrious examples of ſuch conduct: For who can ſay theſe great men were miſled, who fought for the ſame cauſe in the plains of Marathon?" But inſtead of expreſſing himſelf thus, he gives the matter quite a different turn; and in a ſort of rapture, appealing to thoſe brave defenders of their country, ſays, "No, my fellow-citizens, you have not done wrong, you have not; I proteſt by the ghoſts of thoſe great men who fought for the ſame cauſe in the plains of Marathon." By this appeal to thoſe ancient worthies whoſe memories were in the higheſt eſteem at Athens, that it was the cauſe, and not the ſucceſs, which rendered their actions ſo glorious, he artfully corroborates his aſſertion in a way which he knew muſt have the greateſt weight with his audience.

As the proper ſubjects of this character are either divine things, or ſuch as are in the higheſt eſteem and regard among mankind, which often require laudatory diſcourſes, or panegyric; theſe naturally admit of all the ornaments and aſſiſtance of eloquence. Which, however, muſt be uſed with diſcretion: for when the mind is wrapt up in thought, and ſtretched to the utmoſt of its powers in the purſuit of ſome noble and ſublime idea, it cannot attend to all the leſſer fineries and niceties of language; but, from its own vigour, and lively conception of things, will be led to expreſs them in terms the moſt emphatical, and beſt ſuited to their nature. In ſuch caſes therefore, the ſublimity muſt appear rather from the elevation of the thought, attended with a ſimplicity of expreſſion, than from the ornaments and dreſs of the language. Theſe things ſeem more natural when the mind is relaxed, and employed upon lower objects. Though, upon the whole, grandeur and majeſty of expreſſion is the proper mark of this character with relation to the language, as beauty and ſplendor is of the middle ſtyle.

CHAP. VIII. *Of the Style of an Orator.*

121 THE ſtyle of an orator comprehends all the characters already explained, of *low*, *middle*, and *ſublime*, as they are applied by him in the different parts of his province. For that the language muſt be ſuited to the nature of the ſubject, we have had occaſion often to obſerve already; and the different view of the ſpeaker or writer, neceſſarily occaſions a variety in the manner of expreſſion. Now an orator has three things in his view; to prove what he aſſerts, to repreſent it in an agreeable light, and to move the paſſions.

---

† *Burnet's Theory.*

ſions. Theſe are all neceſſary, we do not mean in the order wherein we have now mentioned them, but that the diſcourſe may upon the whole have its deſired effect upon the audience. For unleſs the mind be convinced of the truth of what is offered by ſolid and cogent arguments, neither will the moſt eloquent diſcourſe afford a laſting pleaſure, nor the moſt pathetic long influence the affections. Though, on the other hand, the hearers expect to be entertained at the ſame time they are informed; and therefore, unleſs the language be agreeable to their taſte, they will ſoon call off their attention, and think but meanly of the ſpeaker. And unleſs both theſe are warmed and animated by a becoming pathos, the ſpeaker may very probably miſs of his end, in bringing his audience over to his ſentiments. For bare conviction is not ſufficient with many perſons to excite them to action. They will acquieſce in the truth of a thing which they cannot contradict, or will not give themſelves the trouble to examine; and at the ſame time remain unconcerned to proſecute it. And the pleaſure of a florid diſcourſe will of itſelf ſoon vaniſh, like the harmony of muſic, or the charms of a fine poem. And therefore to captivate his audience, ſecure them in his intereſt, and puſh them upon action, it is neceſſary for the orator to engage their affections: theſe are, as it were, the ſprings of the ſoul, which, managed by a ſkilful hand, move and direct it at pleaſure. Now each of theſe parts of an orator's province requires a different ſtyle. The *low ſtyle* is moſt proper for proof and information; becauſe he has no other view here but to repreſent things to the mind in the plaineſt light, as they really are in themſelves, without colouring or ornament. The *middle ſtyle* is moſt ſuited for pleaſure and entertainment, becauſe it conſiſts of ſmooth and well-turned periods, harmonious numbers, with florid and bright figures. But the *ſublime* is neceſſary in order to ſway and influence the paſſions. Here the orator calls in all the aſſiſtance both of nature and art; the moſt raiſed and lofty thoughts, cloathed with the brighteſt and ſtrongeſt colouring, enter into this character.

But as an orator has frequently each of theſe views in the ſame diſcourſe, we ſhall firſt give a ſummary deſcription of the ſeveral characters of ſtyle, which we have formerly diſcourſed on more at large; that, by placing them together in one view, the difference between them may be more plain and obvious: and then we ſhall proceed to ſhew to what particular parts of a diſcourſe each of them is more eſpecially to be applied.

I. Firſt, then, as ſhorter periods are proper in the *low ſtyle*, ſo leſs care is neceſſary in their turn and cadency. If a ſentence now and then drop unexpectedly, and diſappoint the ear, or has ſomething rough and harſh in its compoſition, it is no blemiſh in this character. For as it is ſuited to the manner of common diſcourſe, an appearance of regard to the ſubject, rather than the form of expreſſion, is more becoming than any beauties of art. But the words ſhould be well choſen and proper, ſuited to the ideas they are deſigned to convey; the expreſſions plain and clear, and the artificial ornaments few and modeſt. By *artificial ornaments* are here meant *tropes* and *figures*; and they are called *artificial*, becauſe they vary from the natural dreſs of language, either in the words or manner of expreſſion: though they are often uſed by thoſe who are wholly unacquainted with the rules of art; and particularly metaphors, which perſons who have the leaſt command of language frequently run into through mere neceſſity, for want of a ſufficient ſtock of proper words to convey their ideas. The low ſtyle therefore admits of theſe: but care ſhould be taken to chooſe ſuch as have been rendered familiar by uſe, or at leaſt where the ſimilitude is very plain and evident. Bold or lofty metaphors, or where the alluſion is dark and remote, ought to be avoided. Nor is the moderate uſe of the other tropes wholly diſagreeable to this ſtyle. And the ſame thing is to be ſaid with reſpect to verbal figures, or ſuch as conſiſt in the particular diſpoſition of the ſentence, ſo that if the form of it be changed, the figure is loſt. Of theſe, ſuch as come neareſt to the natural way of expreſſion are moſt proper for this ſtyle; and therefore thoſe which conſiſt in a jingle of words, ariſing from the ſame or a like ſound, are to be avoided, as carrying in them too much the appearance of art. Thoſe likewiſe which conſiſt in a repetition of the ſame word have often too great a force and vehemence for this mild and gentle character. And as to figures of ſentences, which do not depend on the conſtruction of words, but lie in the ſenſe, many of them are too gay and ſprightly, and others too rapid and impetuous, for the ſimplicity of the low ſtyle; ſo that only the more moderate and ſedate ones are to be allowed a place here. It is therefore no wonder if perſons are often miſtaken in their notions of this character; the beauty of which conſiſting in a certain plainneſs and ſimplicity, without any thing in it but what ſeems natural and common, every one is apt to imagine he can readily be maſter of it, till by experience he finds the contrary. For the caſe is much the ſame here, as in perſons of faſhion and good breeding, whoſe behaviour and addreſs is attended with that agreeable freedom and ſeeming negligence, which in appearance is very eaſy to expreſs, but in reality is ſcarce imitable by others.

As the *middle ſtyle* is more adapted for pleaſure and delight, it admits of all thoſe beauties and ornaments which ſoothe and entertain the mind. It has more force and energy than the low ſtyle, but leſs than the ſublime. Smooth and harmonious numbers, well-turned periods, of a juſt length, delightful cadency, and accurate diſpoſition of the words, are ſuited to this ſtyle. The moſt beautiful and ſhining tropes, which ſtrike the fancy, and all thoſe verbal figures which, by a repetition, ſimilitude, or proportion of ſounds, pleaſe and gratify the ear, help to form this character. The like is to be ſaid as to figures of ſentences: The moſt florid and beautiful, ſuch as enumeration, deſcription, ſimilitude, and the like, are here the moſt proper.

But it is the *ſublime ſtyle* which perfects the orator. This requires the moſt forcible and emphatical words, the boldeſt metaphors, and ſtrongeſt figures. In verbal figures, repetitions, ſynonyms, gradations, contraries, with others of a like force and energy, are chiefly employed here. But figures of ſentences are the moſt conſiderable, and principally contribute to make up this character. Among theſe are ſimilies taken from lofty ſubjects, proſopopœia, apoſtrophe, exclamation, epiphonema, apoſiopeſis, and others of a like nature. But due care muſt likewiſe be taken of the form, conſtruction, and harmony of the periods; which ſeem beſt diſpoſed, when long and ſhort ones are intermixed. For though round and ſwelling periods carry in them ſomething grand and majeſtic, yet many times they move too ſlow to ſtrike the paſſions; whereas ſhort ones are more acute and pungent, and, by returning quick, awaken the mind, and raiſe the paſſions. But to render it complete, it muſt be ſupported with ſtrong reaſon, grandeur of thought, and ſentiments every way equal to the expreſſion; without which it will be very liable to ſwell into bombaſt, and end barely in amuſement.

II. Having given a ſhort ſketch of this part of the orator's furniture, we ſhall now go on to ſhew where, and in what manner, he is to make uſe of it. This will beſt appear by conſidering his principal view in each part of his diſcourſe. Now the parts of a juſt oration (as we have formerly ſhewn) are ſix; *Introduction*, *Narration*, *Propoſition*, *Confirmation*, *Confutation*, and *Concluſion*. Not that all theſe are neceſſary in every diſcourſe; but it is proper they ſhould all be mentioned, that we may conſider what ſtyle is fitteſt for them, when they are neceſſary.

122 In the *introduction*, the orator has three things before him; to gain the eſteem of his hearers, to ſecure their attention, and to give them ſome general notion of his ſubject. To ſet out modeſtly, is undoubtedly the moſt likely way to recommend himſelf. For to attempt to inflame an audience, before they are prepared for it, or ſee the reaſon of much warmth, is highly improper. A prudent ſpeaker will, like Demoſthenes, begin with temper, and riſe gradually, till he has inſenſibly warmed his hearers, and in ſome degree engaged their affections in his favour. So that this part ſcarce riſes above the middle ſtyle. And if it carry in it an air of pleaſantry and good-humour, it is generally the more apt to engage the attention.

123 The introduction is uſually followed by the *narration*, or a recital of ſuch things as either preceded, accompanied, or followed upon the ſubject under conſideration. Now as the qualities that recommend a narration are clearneſs, brevity, and probability; theſe ſufficiently point out the ſtyle. Perſpicuity ariſes from the choice of proper words, and ſuch tropes as have been rendered moſt familiar by uſe; brevity requires moderate periods, whoſe parts are but little tranſpoſed; and a plain and ſimple dreſs, without ornament or colouring, is beſt ſuited to repreſent things probable: all which are the properties of the low ſtyle. And therefore Cicero ſays, *narrations come pretty near to our ordinary diſcourſe*. Indeed, ſometimes it is neceſſary not only to relate the facts themſelves, but likewiſe to deſcribe the manner in which they were performed. And then a further degree of art may be requiſite to repreſent them with all their circumſtances, and paint them to the mind in their proper colours.

124 The next part in order is the *propoſition*, or ſubject of the diſcourſe, in which there can be no room for ornament. But as it is the baſis and foundation of the orator's whole deſign, it ought to be laid down in the plaineſt and cleareſt terms, ſo as to leave no room for doubt or uncertainty what it is which he intends to diſcourſe upon.

125 The next thing is *confirmation*, wherein the orator endeavours to maintain and defend his own cauſe, and to convince his hearers of the truth of it by reaſon and argument. Now the low ſtyle is certainly fitteſt for cool reaſoning and debate. But the orator's method of reaſoning often very much differs from that of the philoſopher. The latter contents himſelf with the moſt plain and familiar manner of repreſenting the truth, and thinks it ſufficient if what he ſays be clearly underſtood. But the former, at the ſame time that he convinces the judgment, endeavours likewiſe to affect the paſſions, and that in a great variety of ways. So that in this part of the diſcourſe the ſtyle is very different, according to the nature and circumſtances of the cauſe. Sometimes, while he is dwelling upon the proof of a thing, he talks coolly, and reaſons with the ſedateneſs of a philoſopher; and where any part of his argument appears doubtful or obſcure, he endeavours with the ſame even temper to explain and clear it up. But frequently he intermixes with his proofs all the arts of perſuaſion, and embelliſhes his reaſons with the greateſt ornaments and beauties of eloquence.

126 Confirmation is uſually followed by *confutation*, in which the orator endeavours to enervate and overthrow all that has been advanced in favour of the oppoſite ſide of the queſtion. But as the ſtyle is much the ſame here as in the former part; what has been ſaid upon this, may be ſufficient for this likewiſe.

127 The laſt part above-mentioned is the *concluſion*. This conſiſts of two branches, *recapitulation* and *addreſs*. Recapitulaſion is a ſhort recital of the ſeveral arguments, or at leaſt the chief of them, which were before advanced in ſupport of the cauſe; that, being brought together into a narrow compaſs, they may appear in a ſtronger light. Wherefore the language here ought rather to be forcible and ſtrong than florid, becauſe brevity and conciſeneſs is a neceſſary quality. The other branch of the concluſion conſiſts in an addreſs to the paſſions, and is wholly perſuaſive; for which the ſpeaker is now entirely at leiſure. Indeed, this is often done occaſionally in other parts of the diſcourſe, particularly in the introduction and confirmation: But as in the former of theſe, his view is principally to ſecure the good opinion of the hearers, and excite their attention; and in the latter to defend his own ſide of the queſtion by reaſon and argument; when theſe two points are gained, he has nothing left but to prevail with them to fall in with his deſign, and declare for him. And the beſt way to attain this is, by engaging their paſſions in his intereſt. Hence then, to uſe Quintilian's words, "All the ſprings of eloquence are to be opened. Now we are paſt the rocks and ſhallows, all the ſails may be hoiſted. And as the greateſt part of the concluſion conſiſts in illuſtration, the moſt pompous language and ſtrongeſt figures have place here."

All the variety above-mentioned, however, is not always neceſſary. Regard muſt be had to the nature of the ſubject, the time, place, perſons, and other circumſtances; by all which the ſtyle is to be regulated.

To diſcourſe in a lofty and grand way upon a common topic, or in a low and flat manner upon a ſublime argument, are both equally injudicious. Cicero refers us to ſome diſcourſes of his own, as inſtances of each kind. His oration for Cæcina, he ſays, is written in the low ſtyle, that for the Manilian law in the middle ſtyle, and that for Rabirius in the ſublime; and his Actions againſt Verres, with ſome others, are patterns of the variety here mentioned. And he gives us a very comprehenſive deſcription of a perfect orator in a very few words, when he ſays: "He is one who can ſpeak upon a low ſubject acutely, upon a lofty ſubject with ſublimity, and upon a moderate ſubject temperately." By which he means no more, than one who is maſter of the three characters here deſcribed, and knows when and how to uſe them. But although he mentions ſeveral among the Greeks, and ſome few among the Romans, who excelled in one or other of theſe different kinds; yet one who excelled in them all, he ſuppoſes never to have exiſted, except in the imagination. The reaſon perhaps may be, becauſe each of them ſeems to require a very different genius, ſo that it is ſcarce poſſible for the ſame perſon to ſucceed in them all. Since therefore it is ſo rare and difficult a matter to gain the command of each in any good degree, it is better perhaps for every one to purſue that which nature ſeems moſt inclined to, and to excel in it, than to ſtrive againſt their genius. For every kind has its perfections; and it is more commendable to be maſter of one thing, than to do ſeveral but indifferently.

PART IV. OF PRONUNCIATION.

CHAP. I. *Of Pronunciation in general.*

128 PRONUNCIATION is alſo called *Action* by ſome of the ancients. Though if we attend to the proper ſignification of each of theſe words, the former reſpects the voice, and the latter the geſtures and motions of the body. But if we conſider them as ſynonymous terms, in this large ſenſe pronunciation or action may be ſaid to be, *a ſuitable conformity of the voice, and the ſeveral motions of the body, in ſpeaking, to the ſubject matter of the diſcourſe.*

The beſt judges among the ancients have repreſented this as the principal part of an orator's province, from whence he is chiefly to expect ſucceſs in the art of perſuaſion. When Cicero, in the perſon of Craſſus, has largely and elegantly diſcourſed upon all the other parts of oratory, coming at laſt to ſpeak of this, he ſays: "All the former have their effect as they are pronounced. It is the action alone that governs in ſpeaking; without which the beſt orator is of no value, and is often defeated by one in other reſpects much his inferior." And he lets us know, that Demoſthenes was of the ſame opinion, who, when he was aſked what was the principal thing in oratory, replied, Action; and being aſked again a ſecond and a third time, what was next conſiderable, he ſtill made the ſame anſwer." By which he ſeemed to intimate, that he thought the whole art did in a manner conſiſt in it. And indeed, if he had not judged this highly neceſſary for an orator, he would ſcarce have taken ſo much pains in correcting thoſe natural defects, under which he laboured at firſt, in order to acquire it. For he had both a weak voice, and likewiſe an impediment in his ſpeech, ſo that he could not pronounce diſtinctly ſome particular letters. The former of which defects he conquered, partly by ſpeaking as loud as he could upon the ſhore, when the ſea roared and was boiſterous; and partly, by pronouncing long periods as he walked up-hill; both which methods contributed to the ſtrengthening of his voice. And he found means to render his pronunciation more clear and articulate, by the help of ſome little ſtones put under his tongue. Nor was he leſs careful in endeavouring to gain the habit of a becoming and decent geſture; for which purpoſe he uſed to pronounce his diſcourſes alone before a large glaſs. And becauſe he had got an ill cuſtom of drawing up his ſhoulders when he ſpoke; to amend that, he uſed to place them under a ſword, which hung over him with the point downward. Such pains did this prince of the Grecian orators take to remove thoſe difficulties, which would have been ſufficient to diſcourage an inferior and leſs aſpiring genius. And to how great a perfection he arrived in his action, under all theſe diſadvantages, by his indefatigable diligence and application, is evident from the confeſſion of his great adverſary, and rival in oratory, Eſchines. "Who, when he could not bear the diſgrace of being worſted by Demoſthenes in the cauſe of Cteſiphon, retired to Rhodes. And being deſired by the inhabitants to recite to them his own oration upon that occaſion, which accordingly he did; the next day they requeſted of him to let them hear that of Demoſthenes; which having pronounced in a moſt graceful manner, to the admiration of all who were preſent, "How much more, (ſays he,) would you have wondered, if you had heard him ſpeak it himſelf!" By which he plainly gave Demoſthenes the preference in that reſpect. We might add to theſe authorities the judgment of Quintilian, who ſays, that "it is not of ſo much moment what our compoſitions are, as how they are pronounced; ſince it is the manner of the delivery, by which the audience is moved." And therefore he ventures to aſſert, that, "an indifferent diſcourſe, aſſiſted by a lively and graceful action, will have greater efficacy than the fineſt harangue, which wants that advantage."

The truth of this ſentiment of the ancients, concerning the power and efficacy of pronunciation, might be proved from many inſtances; but one or two may here ſuffice. Hortenſius, a cotemporary with Cicero, and while living next to him in reputation as an orator, was highly applauded for his action. But his orations after his death, as Quintilian tells us (for we have none of them now remaining), did not appear anſwerable to his character; from whence he juſtly concludes, there muſt have been ſomething pleaſing when he ſpoke, by which he gained his character, which was loſt in reading them. But perhaps there is ſcarce a more conſiderable inſtance of this than in Cicero himſelf. After the death of Pompey, when

Cæſar had got the government into his own hands, many of his acquaintance interceded with him in behalf of their relations and friends, who had been of the contrary party in the late wars. Among others, Cicero ſolicited for his friend Ligarius; which Tubero underſtanding, who owed Ligarius a grudge, he oppoſed it, and undertook to repreſent him to Cæſar as unworthy of his mercy. Cæſar himſelf was prejudiced againſt Ligarius; and therefore, when the cauſe was to come before him, he ſaid, "We may venture to hear Cicero diſplayhis eloquence; for I know the perſon he pleads for to be an ill man, and my enemy." But, however, in the courſe of his oration, Cicero ſo worked upon his paſſions, that by the frequent alteration of his countenance, the emotions of his mind were very conſpicuous. And when he came to touch upon the battle of Pharſalia, which had given Cæſar the empire of the world, he repreſented it in that moving and lively manner, that Cæſar could no longer contain himſelf, but was thrown into ſuch a fit of ſhivering, that he dropped the papers which he held in his hand. This was the more remarkable, becauſe Cæſar was himſelf one of the greateſt orators of that age, knew all the arts of addreſs, and avenues to the paſſions, and conſequently was better prepared to guard againſt them. But neither his ſkill, nor reſolution of mind, was of ſufficient force againſt the power of oratory; but the conqueror of the world became a conqueſt to the charms of Cicero's eloquence; ſo that, contrary to his intention, he gave into his plea, and pardoned Ligarius. Now that oration is ſtill extant, and appears exceedingly well calculated to touch the ſoft and tender paſſions, and ſprings of the ſoul; but we believe it can ſcarce be diſcernible to any in reading it, how it ſhould have had ſo ſurpriſing an effect; which muſt therefore have been chiefly owing to the wonderful addreſs and conduct of the ſpeaker.

The more natural the pronunciation is, it will of conſequence be the more moving, ſince the perfection of art conſiſts in its neareſt reſemblance to nature. And therefore it is not without good reaſon, that the ancients make it one qualification of an orator, that he be a good man; becauſe a perſon of this character will make the cauſe he eſpouſes his own, and the more ſenſibly he is touched with it himſelf, his action will be the more natural, and by that means the more eaſily affect others in the ſame manner. Cicero, ſpeaking upon this ſubject, ſays: "It is certain that truth (by which he means nature) in every thing excels imitation; but if that was ſufficient of itſelf in action, we ſhould have no occaſion for art." In his opinion therefore (and who was ever a better judge?) art in this caſe, as well as in many others, if well managed, will aſſiſt and improve nature. But that is not all; for ſometimes we find the force of it ſo great and powerful, that, where it is wholly counterfeit, it will for the time work the ſame effect as if it was founded in truth. This is well known to thoſe who have been converſant with the repreſentations of the theatre. In tragedies, though we are ſenſible that every thing we ſee and hear is feigned and counterfeit, yet ſuch is the power of action, that we are oftentimes affected by it in the ſame manner as if they were all realities. Anger and reſentment at the appearance of cruelty, concern and ſolicitude for diſtreſſed virtue, riſe in our breaſts; and tears are extorted from us for oppreſſed innocence; though at the ſame time, perhaps, we are ready to laugh at ourſelves for being thus decoyed. If art then has ſo great an influence upon us, when ſupported only by fancy and imagination; how powerful muſt be the effect of a juſt and lively repreſentation of what we know to be true and real?

How agreeable it is both to nature and reaſon, that a warmth of expreſſion and vehemency of motion ſhould riſe in proportion to the importance of the ſubject and concern of the ſpeaker, will further appear, by looking back a little into the more early and ſimple ages of the world. For the higher we go, the more we ſhall find of both. We ſhall give the obſervation of a very great man upon this head, in his own words. "The Romans (ſays he) had a very great talent this way, and the Greeks a greater. The eaſtern nations excelled in it, and particularly the Hebrews. Nothing can equal the ſtrength and vivacity of the figures they employed in their diſcourſe; and the very actions they uſed to expreſs their ſentiments; ſuch as putting aſhes on their heads, and tearing their garments, and covering themſelves with ſackcloth under any deep diſtreſs and ſorrow of mind. I do not ſpeak of what the prophets did to give a more lively repreſentation of the things they foretold, becauſe ſuch figurative actions were the effect of divine inſpiration. But even in other caſes we find thoſe people underſtood much better than we do how to expreſs their grief, and fear, and other paſſions. And hence, no doubt, aroſe thoſe ſurpriſing effects of eloquence, which we never experience now." Thus far this excellent writer. And what he ſays here with reſpect to the actions of the eaſtern nations, was in a good meaſure cuſtomary among the Greeks and Romans; if not entirely of the ſame kind, yet perhaps as vehement and expreſſive. They did not think language of itſelf ſufficient to expreſs the height of their paſſions, unleſs enforced by uncommon motions and geſtures. Thus, when Achilles had driven the Trojans into their city with the greateſt precipitation and terror, and only Hector ventured to tarry without the gates to engage him; Homer repreſents both king Priam and his queen under the higheſt conſternation for the danger of their ſon. And therefore, in order to prevail with him to come into the city, and not fight with Achilles, they not only intreat him from the walls in the moſt tender and moving language imaginable: but he tears off his grey locks with his hands; and ſhe in a flood of tears expoſes her breaſts, and adjures him by thoſe paps which ſuckled him, to comply with their requeſt. The poet knew very well, that no words of themſelves could repreſent thoſe agonies of mind he endeavoured to convey, unleſs heightened by the idea of ſuch actions as were expreſſive of the deepeſt ſorrow. And indeed this was anciently eſteemed ſo requiſite in an orator, that in matters of importance he was ſcarce thought to be in earneſt, who wanted it. In one of Cicero's orations, he does not ſtick to argue in that manner with his adverſary. "Would you talk thus (ſays he) if you was ſerious? Would you, who are wont to diſplay your eloquence ſo warmly in the danger of others, act ſo coldly in your own? Where is that concern, that ardour, which uſed to extort pity even from children? Here is no emotion either of mind or

Dial. of Eloquence, p. 92.

or body; neither the forehead ſtruck, nor the thigh, nor ſo much as a ſtamp of the foot. Therefore, you have been ſo far from inflaming our minds, that you have ſcarce kept us awake."

As action therefore was judged ſo neceſſary a qualification in an orator among the ancients, ſo they made uſe of ſeveral methods and expedients for the better attaining it. The principal of which we ſhall briefly mention.

Decency of pronunciation is an habit. And as all habits are gained by time, ſo the ſooner they are learned, they are generally acquired with greater eaſe. For while perſons are young, they are not only more flexible, and capable of any particular bent, but they are likewiſe free from the trouble of encountering and ſubduing contrary habits, which doubles the labour, and increaſes the difficulty of attaining any laudable quality. Quintilian was very ſenſible of this in the caſe here before us; and therefore, in order to have perſons trained up to it, he begins with them in their childhood, and deſcends ſo low as even to give directions how they ſhould be taught to pronounce when they firſt learn to read. And he adviſes, that they ſhould then be inſtructed where to ſuſpend their voice, and make the proper pauſes, both in diſtinguiſhing the ſeveral parts of the ſame ſentence, and in ſeparating one ſentence from another: likewiſe when to raiſe, or ſink their voice, or give it a proper inflection; to be ſlower or faſter, more vehement or ſedate, as the nature of the things may require; and that the tone of their voice be always manly and grave, but at the ſame time mixed with an agreeable ſweetneſs. Theſe things may perhaps appear in themſelves ſmall; but if duly attended to, they will be found of conſiderable ſervice to bring us to a juſt and proper pronunciation. For in every thing that is to be attained by practice, it is a great advantage to ſet out right at firſt.

The ancients likewiſe had perſons, whom they called *phonaſci*, whoſe proper buſineſs it was to teach them how to regulate and manage their voice; and others, who inſtructed them in the whole art of pronunciation, both as to their voice and geſtures. Theſe latter were generally taken from the theatre, being ſome eminent experienced actors. So Quintilian, treating of the province of theſe perſons, ſays: "The comedian ought to teach them how to relate facts, with what authority to adviſe, with what vehemence to expreſs anger, and with what ſoftneſs compaſſion." And ſpeaking of geſtures, he ſays, "He ſhould admoniſh them to raiſe their countenance, not diſtort their lips, or ſtretch their mouths." With ſeveral other directions of the like kind. And we are told concerning the emperor M. Antoninus, uſually called the philoſopher, that, *His firſt maſters were Euphorio the grammarian, and Geminus the comedian.*

But though they made uſe of actors to inſtruct their youth in forming their ſpeech and geſtures, yet the action of an orator was much different from that of the theatre. Cicero very plainly repreſents this diſtinction, in the words of Craſſus, when, ſpeaking of orators, he ſays: "The motions of the body ought to be ſuited to the expreſſions, not in a theatrical way, mimicking the words by particular geſticulations; but in a manner expreſſive of the general ſenſe; with a ſedate and manly inflection of the ſides; not taken from the ſtage and actors, but from the exerciſe of arms and the paleſtra." And Quintilian ſays to the ſame purpoſe: "Every geſture and motion of the comedians is not to be imitated, nor to the ſame degree." They thought the action of the theatre too light and extravagant for the imitation of an orator; and therefore, though they employed actors to inform young perſons in the firſt rudiments, yet they afterwards ſent to the paleſtra, or ſchools deſigned on purpoſe to teach them a decent and graceful management of their bodies. And ſuch ſchools, as Quintilian informs us, were in uſe both among the Greeks and Romans: Juſt as of later ages children learn to dance, in ſome meaſure with the ſame intention.

Being thus far prepared, they were afterwards ſent to the ſchools of the rhetoricians. And here, as their buſineſs was to cultivate their ſtyle, and gain the whole art of eloquence; ſo particularly to acquire a juſt and accurate pronunciation by thoſe exerciſes, in which for that end they were conſtantly employed. And as the Greeks were moſt celebrated for their ſkill in all the polite arts, and eſpecially oratory; the Roman gentry and nobility generally ſent their ſons abroad, and placed them under the tuition of ſome Grecian maſter, to inſtruct them in the art of ſpeaking, and by that means to fit them for the ſervice of their country, either in the courts of judicature or the ſenate. Thus Cicero was ſent to Rhodes, to ſtudy under the famous Molo, and Brutus under Pammenes; Cæſar was going to the ſame place when taken by pirates; and Auguſtus afterwards ſtudied there under Apollodorus.

Nor, after all this pains and induſtry, did they yet think themſelves ſufficiently qualified to take upon them the character of orators. But it was their conſtant cuſtom to get together ſome of their friends and acquaintance who were proper judges of ſuch performances, and declaim before them in private. The buſineſs of theſe perſons was to make obſervations both on their language and pronunciation. And they were allowed the greateſt freedom to take notice of any thing they thought amiſs, either as to inaccuracy of method, impropriety of ſtyle, or indecency of their voice or actions. This gave them an opportunity to correct any ſuch defects at firſt, before they became habitual. What effects might not juſtly be expected from ſuch an inſtitution? Perſons trained up in this manner, with all thoſe advantages, joined to a good natural genius, could not fail of making very complete orators. Though even after they came to appear in public, they did not lay aſide the cuſtom of declaiming. For Quintilian tells us, that *C. Carbo uſed to practiſe it daily in his tent.* And Auguſtus is reported to have continued it during the war of Mutina againſt M. Anthony. Nor is it to be ſuppoſed, that ſo conſtant an attendance to this practice was only ſerviceable to them in their public performances; but it muſt neceſſarily affect their whole conduct, give them a freedom of ſpeech, eaſineſs of addreſs and behaviour, and render them in all reſpects fine gentlemen, as well as excellent orators. And from hence perhaps we may ſee leſs reaſon to wonder at the ſurpriſing effects of ſome of their diſcourſes, when we conſider what pains they took to arrive at thoſe abilities.

Having thus far treated on pronunciation in general, we ſhall now proceed to conſider the parts of it ſeparately; which are, *voice* and *geſture*.

Chap. II. *Of the Voice.*

129 Voice is one kind of ſounds. Now the influence of ſounds, either to raiſe or allay our paſſions, is evident from muſic. And certainly the harmony of a fine diſcourſe, well and gracefully pronounced, is as capable to move us, if not in a way ſo violent and ecſtatic, yet no leſs powerful, and more agreeable to our rational faculties. As the buſineſs of this chapter is to offer ſome conſiderations for the juſt and decent management of the voice, it may not be improper in the firſt place to obſerve in general, what nature does, when free and unconſtrained. As perſons are differently affected when they ſpeak; ſo they naturally alter the tone of their voice, though they do not attend to it. It riſes, ſinks, and has various inflections given it, according to the preſent ſtate and diſpoſition of the mind. When the mind is calm and ſedate, the voice is moderate and even; when the former is dejected with ſorrow, the latter is languid; and when that is inflamed by paſſion, this is raiſed and elevated. It is the orator's buſineſs, therefore, to follow nature, and to endeavour that the tone of his voice appear natural and unaffected. And for this end, he muſt take care to ſuit it to the nature of the ſubject; but ſtill ſo as to be always grave and decent. Some perſons continue a diſcourſe in ſuch a low and drawling manner, that they can ſcarce be heard by their audience. Others again hurry on in ſo loud and boiſterous a manner as if they imagined their hearers were deaf. But all the muſic and harmony of ſpeech lies in the proper temperament of the voice between theſe extremes. In order to ſet this matter in a juſt light, it will be neceſſary to conſider the principal affections or properties of the voice, and how they are to be regulated by an orator. Now theſe may all be referred either to *quantity* or *quality*.

The *quantity* of the voice conſiſts in its *highneſs* or *lowneſs*, *ſwiftneſs* or *ſlowneſs*, and the intermediate degrees between them.

Every perſon who ſpeaks in public, ſhould endeavour, if he can, to fill the place where he ſpeaks. But ſtill he ought to be careful not to exceed the natural key of his voice. If he does, it will neither be ſoft nor agreeable; but either harſh and rough, or too ſhrill and ſqueaking. Beſides, he will not be able to give every ſyllable its full and diſtinct ſound; which will render what he ſays obſcure, and difficult to be underſtood. He ſhould therefore take care to keep his voice within reach, ſo as to have it under management, that he may raiſe or ſink it, or give it any inflection he thinks proper: Which it will not be in his power to do, if he put a force upon it, and ſtrain it beyond its natural tone.

The like caution is to be uſed againſt the contrary extreme, that the voice be not dropped, and ſuffered to ſink too low. This will give the ſpeaker pain in raiſing it again to its proper pitch, and be no leſs offenſive to the hearers. For though the muſic of ſpeech conſiſts in the variations of the voice, yet they muſt be gradual to render them pleaſant. Such ſudden and great changes at once are rather to be eſteemed chaſms in ſpeaking, than variations. Beſides, as they often prevent the hearers from taking in the ſenſe of what is ſaid, it gives them no ſmall uneaſineſs that they are obliged to ſtretch their attention. Many perſons are too apt to be guilty of this, eſpecially at the end of a ſentence, by dropping the laſt word; which ought in a particular manner to be expreſſed diſtinctly, becauſe the meaning of the whole ſentence often depends upon it.

The medium between theſe two is a moderate and even voice. But this is not the ſame in all; that which is moderate in one would be high in another. Every perſon therefore muſt regulate it by the natural key of his own voice. A calm and ſedate voice is generally beſt; as a moderate ſound is moſt pleaſing to the ear, if it be clear and diſtinct. But this equality of the voice muſt alſo be accompanied with a variety, otherwiſe there can be no harmony; ſince all harmony conſiſts in variety. Nothing is leſs pleaſing, than a diſcourſe pronounced throughout in one continued tone of the voice, without any change or alteration. Beſides, a variation of the voice is an eaſe to the ſpeaker; as the body is relieved by ſhifting its poſture. The equality therefore we are here ſpeaking of, admits a variety of inflections and changes within the ſame pitch. And when that is altered, the gradations, whether higher or lower, ſhould be ſo gentle and regular, as to preſerve a due proportion of the parts, and harmony of the whole; which cannot be done, when the voice is ſuddenly varied with too great a diſtinction. And therefore it ſhould move from one key to another, ſo as rather to glide like a gentle ſtream, than pour down like a rapid torrent, as an ingenious writer has well expreſſed it. An even voice is beſt fitted to keep the mind to cloſe attention. And therefore, in ſubjects deſigned only for inſtruction, without any addreſs to the paſſions, there is little room for a variety of voice. For the voice ought to agree with the ſtyle; and as upon ſuch ſubjects this ſhould be equal, moderate, and ſmooth, ſo ſhould the other. Every thing, as we ſay, is beautiful in its ſeaſon; and there is a certain propriety in things, which ought always to be regarded. And therefore, an affected variety, ill placed, is as diſagreeable to a judicious audience, as the want of it, where the ſubject requires it. We may find ſome perſons, in pronouncing a grave and plain diſcourſe, affect as many different tones, changes, and variations of their voice, as if they were acting a comedy; which is doubtleſs a very great impropriety. But the orator's province is not barely to apply to the mind, but likewiſe to the paſſions; which require a great variety of the voice, high or low, vehement or languid, according to the nature of the paſſions he deſigns to affect. So that for an orator always to uſe the ſame tone or degree of his voice, and expect to anſwer all his views by it; would be much the ſame thing as if a phyſician ſhould propoſe to cure all diſtempers by one medicine. From hence it is evident, that although various inflections and tones of the voice are requiſite to make it harmonious and pleaſing to the ear; yet the degree of it ſhould differ according to the nature of the ſubject and deſign of the ſpeaker. And, as a perfect monotony is always unpleaſant, ſo it can never be neceſſary in any diſcourſe.

The next property of the voice above-mentioned was *ſwiftneſs*. That ſome expreſſions ought to be pronounced faſter and ſwifter than others, is very manifeſt. Gay and ſprightly ideas ſhould not only be expreſſed louder, but alſo faſter, than ſuch as are ſad and melancholy. And when we preſs an adverſary, the voice ſhould be briſk and quick. But to hurry on in a precipitant manner without pauſing, till ſtopt for want of breath, is certainly a very great fault. This deſtroys not only the neceſſary diſtinction between ſentence and ſentence, but likewiſe between the ſeveral words of the ſame ſentence; nay, and often occaſions us to expreſs our words by halves, while one is thrown ſo faſt upon another, that we are not able to give each its full and juſt ſound. By this means all the grace of ſpeaking is loſt, and in a great meaſure the advantage of hearing. For when the ears of the hearers cannot keep pace with the volubility of the ſpeaker's tongue, they will be little the better for what he ſays. Beſides, by not commanding his voice, and eaſing his breath at the proper pauſes and points of diſtinction, he is often obliged to ſtop in the middle of a ſentence; and ſo divides what ſhould be continued, and joins what ſhould be ſeparated; which muſt neceſſarily deſtroy the ſenſe, and confound his diſcourſe. Young perſons are very liable to this, eſpecially at firſt ſetting out. And it often ariſes from diffidence. They are jealous of their performances, and the ſucceſs they may have in ſpeaking, which gives them a pain till it is over; and this puts them into a hurry of mind, which incapacitates them from governing their voice, and keeping it under that due regulation which perhaps they propoſed to themſelves before they began to ſpeak. And the greater degree ſuch perſons have of a native and ingenuous modeſty, accompanied with a laudable ambition to excel, they are commonly more expoſed to this. For while on the one hand they are fired with an ardent deſire to recommend themſelves, and on the other are fearful of the event, this dubious ſtate of mind is very apt to throw them off their guard, and run them into this exceſs. From which we may ſee the great advantage of having the voice well formed betimes; for when once it is become habitual to ſpeak with juſtneſs and propriety, perſons readily practiſe it without much attention or concern.

And as a precipitant and haſty pronunciation is culpable, ſo likewiſe on the other hand, it is a fault to ſpeak too ſlow. This ſeems to argue a heavineſs in the ſpeaker. And as he appears cool himſelf, he can never expect to warm his hearers, and excite their affections. When not only every word, but every ſyllable is drawn out to too great a length, the ideas do not come faſt enough to keep up the attention without much uneaſineſs. For till the ſenſe is completed, the mind is in ſuſpence; and, if it be held long in that ſituation, it will of courſe flag and grow tired. Indeed, in ſome caſes, it is requiſite the pronunciation ſhould be ſlower than in others; as in repreſenting things great and difficult; or in expreſſing ſome particular paſſions, as admiration or grief. But the extreme we are now ſpeaking of, is a ſlowneſs equally continued through an whole diſcourſe, which muſt neceſſarily render it flat and lifeleſs.

Now, to avoid either of the two extremes laſt mentioned, the voice ought to be ſedate and diſtinct. And in order to render it diſtinct, it is neceſſary, not only that each word and ſyllable ſhould have its juſt and full ſound, both as to time and accent; but likewiſe that every ſentence, and part of a ſentence, ſhould be ſeparated by its proper pauſe and interval. This is more eaſy to be done in reading, from the aſſiſtance of the points; but it is no leſs to be attended to in ſpeaking, if we would pronounce in a diſtinct and graceful manner. For every one ſhould ſpeak in the ſame manner as he ought to read, if he could arrive at that exactneſs. Now the common rule given in pauſing is, that we ſtop our voice at a comma till we can tell one, at a ſemicolon two, at a colon three, and at a full period four. And as theſe points are either accommodated to the ſeveral parts of the ſame ſentence, as the firſt three; or different ſentences, as the laſt; this occaſions the different length of the pauſe, by which either the dependance of what precedes upon that which follows, or its diſtinction from it, is repreſented. And therefore, in the firſt three ſtops, the voice is rather to be ſuſpended in different degrees or meaſures of time, than entirely dropt, to ſhew that the ſenſe is not yet completed. But between ſentence and ſentence we reſpire, and begin anew. So that in long periods, the voice ſhould be favoured by beginning low and ſedately, that it may hold to the end without reſpiration; or if it will not, the breath ought to be recovered without ſinking the voice. For if once the voice drop for want of breath before the period be finiſhed, not only the beauty, but likewiſe the ſenſe of it will be loſt. Quintilian lays a great ſtreſs upon a due attention to theſe pauſes; and ſays, "Though it may appear not ſo conſiderable in itſelf, yet all the other virtues of a good pronounciation are deficient without it."

Hitherto we have conſidered ſuch properties of the voice as reſpect *quantity*, we come now to ſpeak of its *qualities*. And the chief of theſe are *ſtrength* or *weakneſs*, *clearneſs* or *obſcureneſs*, *fulneſs* or *ſmallneſs*, *ſmoothneſs* or *roughneſs*. Now, one half of theſe is what every one would willingly chooſe, as he would wiſh to be free from the others. But it is not in our power to give ourſelves what qualities of the voice we pleaſe; but only to make the beſt uſe we can of what nature has beſtowed upon us. However, ſeveral defects of the voice are capable of being helped by care and proper means; as, on the other hand, the beſt voice may be greatly hurt by ill management and indiſcretion. Temperance is a great preſervative of the voice, and all exceſs is highly prejudicial to it. The voice muſt neceſſarily ſuffer, if the organs of ſpeech have not their proper tone. And in order to their having this, they muſt be kept in a due temperature; that is, they muſt neither be too moiſt nor too dry. If they abound with fluids, theſe will obſtruct the clearneſs of the voice, and render it obſcure and confuſed; and if they are parched with drought, the voice will be harſh and rough. Now all exceſſes, as well as ſome bodily indiſpoſitions, are apt to affect the organs one or other of theſe ways.

A ſtrong voice is very ſerviceable to an orator, becauſe, if it want ſome other advantages, he is, however, capable to make himſelf heard. And if at any time he is forced to ſtrain it, he is in leſs danger of its

Pronunciation.

failing him before he has finiſhed his diſcourſe. But he who has a weak voice, ſhould be very careful not to ſtrain it, eſpecially at firſt. He ought to begin low, and riſe gradually to ſuch a pitch as the key of his voice will well carry him, without being obliged to ſink again afterwards. Frequent inflections of the voice will likewiſe be ſome aſſiſtance to him. But eſpecially he ſhould take care to ſpeak deliberately, and eaſe his voice, by allowing due time for reſpiration at all the proper pauſes. It is an extreme much leſs inconvenient for ſuch a perſon rather to ſpeak too ſlow, than too faſt. But this defect of a weak voice is ſometimes capable of being helped, by the uſe of proper methods; as is evident from the inſtance of Demoſthenes, before-mentioned.

A voice is ſaid to be *clear*, when the organs of ſpeech are ſuited to give every ſingle letter, and all the combinations of them in ſyllables and words, their proper and diſtinct ſound. Such a voice is very pleaſing and agreeable to the hearers; and no leſs an happineſs to the ſpeaker, as it ſaves him a great expence of ſpirits. For a moderate voice, if clear, will be as diſtinctly heard, as one much louder, if thick and obſcure. Which is a great advantage to the ſpeaker, becauſe he can better keep his voice under command, and modulate it at pleaſure, as the ſeveral parts and circumſtances of his diſcourſe may require. On the contrary, an obſcure and confuſed voice is not always occaſioned from a deficiency in the organ; but, many times, is the effect of cuſtom and a bad habit. Some perſons, either from want of due care in their education at firſt, or from inadvertency and negligence afterwards, run into a very irregular and confuſed manner of expreſſing their words; either by miſplacing the accent, confounding the ſound of the letters, or huddling the ſyllables one upon another, ſo as to render what they ſay often unintelligible. Indeed, ſometimes this ariſes from a natural defect, as in the caſe of Demoſthenes; who found a method to rectify that, as well as the weakneſs of his voice. But in faults of this kind, which proceed from habit, doubtleſs the moſt likely way to mend them is to ſpeak deliberately.

A full voice is not the ſame, as a ſtrong, nor a loud voice. It fills the ear, but it is often not pleaſant. And therefore to render it ſo, as well as audible, it ſhould be frequently varied. However, this ſeems better ſuited to the character of an orator, than a ſmall and ſhrill voice: becauſe it has ſomething in it more grave and manly. And thoſe, who have the misfortune of a very ſmall voice, ſhould be cautious of raiſing it to too high a pitch, eſpecially at once; becauſe the ſudden compreſſure of the organ, is apt to occaſion a ſqueaking and very diſagreeable ſound.

A ſoft and ſmooth voice is of all the moſt muſical, eſpecially if it be flexible. And on the contrary, nothing is leſs harmonious than a voice that is harſh and rough. For the one grates as diſagreeably upon the ear, as the other gives it pleaſure and delight.

From the conſideration of theſe ſeveral properties of the voice, we may conclude that to be the beſt, and fitteſt for an orator, which is moderate, diſtinct, firm, clear, and ſmooth, and withal eaſily flexible to the ſeveral degrees and variations of ſound which every part of the diſcourſe may require.

Chap. III. *Of Geſture.*

130

By this is meant, a ſuitable conformity of the motions of the countenance, and ſeveral parts of the body in ſpeaking, to the ſubject-matter of the diſcourſe. The word *geſture* is here uſed in a larger ſenſe than is ordinarily done in common language. For we rarely make uſe of that word to denote the motions of the countenance, or any parts of it; but as theſe make a conſiderable part of our preſent ſubject, they muſt here be comprehended under this term.

It is not agreed among the learned, whether voice or geſture has the greater influence upon us. But as the latter affects us by the eye, as the former does by the ear, geſture in the nature of it ſeems to have this advantage, that it conveys the impreſſion more ſpeedily to the mind; for the ſight is the quickeſt of all our ſenſes. Nor is its influence leſs upon our paſſions; nay, in ſome inſtances it appears to act more powerfully. A caſt of the eye ſhall expreſs deſire in as moving a manner, as the ſofteſt language; and a different motion of it, reſentment. To wring the hands, tear the hair, or ſtrike the breaſt, are all ſtrong indications of ſorrow. And he who claps his hand to his ſword, throws us into a greater panic than one who only threatens to kill us. Nor is it in ſome reſpects leſs various and extenſive than language. Cicero tells us, he often diverted himſelf by trying this with Roſcius the comedian; who could expreſs a ſentence as many ways by his geſtures, as he himſelf by words. And ſome dramas have been carried on wholly by mutes, who have performed every part by geſtures only, without words, in a way very intelligent, as well as entertaining to the ſpectators. Well thereſore might Cicero call *action* (or geſture) *the language of the body*, ſince it is capable in ſo lively a manner to convey both our ideas and paſſions. But with reſpect to oratory, geſture may very properly be called the *ſecond part of pronounciation*; in which, as the voice ſhould be ſuited to the impreſſions it receives from the mind, ſo the ſeveral motions of the body ought to be accommodated to the various tones and inflections of the voice. When the voice is even and moderate, little geſture is required; and nothing is more unnatural than violent motion, in diſcourſing upon ordinary and familiar ſubjects. The motions of the body ſhould riſe therefore in proportion to the vehemence and energy of the expreſſion, as the natural and genuine effect of it.

But as geſture is very different and various as to the manner of it, which depends upon the decent conduct of ſeveral parts of the body; it will not be amiſs to conſider more particularly, the proper management of each of thoſe parts. Now all geſture is either natural, or from imitation. By natural geſture we mean ſuch actions and motions of the body, as naturally accompany our words, as theſe do the impreſſions of our minds. And theſe either reſpect the whole body, or ſome particular part of it. But before we enter upon this, give us leave juſt to obſerve, that it has been cuſtomary in all ages and countries, in making a ſet diſcourſe before an aſſembly, to do it ſtanding. Thus we read, that, *Abraham ſtood up, and ſpake unto the children of Heth.* And it ſeems as if he ſat down, when he had ended his ſpeech; becauſe, immediately after the account of their anſwer, it is ſaid again, that *Abraham ſtood up and bowed himſelf to the people of the land, the children of Heth.* In like manner Homer repreſents the Grecian princes, as ſtanding up, when they made a ſpeech, either to the army, or in their councils. So when Achilles has aſſembled the army, to inquire into the reaſon of the great plague which at that time raged among them, he riſes up before he begins to ſpeak, and ſits down again when he has done. After him the prophet Calchas riſes, and charges it upon Agamemnon; who riſing up in a paſſion, does not refuſe to comply with what Calchas propoſed, but expreſſes his reſentment at him for ſaying it. And upon another occaſion, both Agamemnon and Neſtor do the ſame in council. And Cicero acquaints us, that when Lentulus had been charged in the ſenate, as an aſſociate with Catiline, he ſtood up to make his defence. Nor does the advantage of being better heard, ſeem to have been the only reaſon for ſo general an agreement in this poſture; but it appears likewiſe to have been choſen, as the moſt decent and reſpectful. Sitting carries in it an air of authority, and is therefore a poſture ſcarce uſed upon ſuch occaſions, unleſs perhaps where that is deſigned to be expreſſed by it. Wherefore it was a thing very much reſented, that when Cæſar, after he had got the power into his hands, being once addreſſed to the ſenate, either refuſed to riſe, as ſome ſay, or as others, one of his friends held him down by his gown.

But though ſtanding appears to be the moſt proper poſture for ſpeaking in public, yet it is very unbecoming for the body to be entirely without any motion like a ſtatue. It ſhould not long continue in the ſame poſition, but be conſtantly changing, though the motion be very moderate. There ought to be no appearance of ſtiffneſs, but a certain eaſe and pliableneſs, naturally ſuiting itſelf to every expreſſion; by which means, when a greater degree of motion is neceſſary, it will appear leſs ſudden and vehement. For as the raiſing, ſinking, and various inflections of the voice muſt be gradual; ſo likewiſe ſhould the motions of the body. It is only on ſome particular occaſions, that an haſty vehemence and impetuoſity is proper in either caſe.

As to the ſeveral parts of the body, the head is the moſt conſiderable. To lift it up too high has the air of arrogance and pride; to ſtretch it out too far, or throw it back, looks clowniſh and unmannerly; to hang it downwards on the breaſt, ſhews an unmanly baſhfulneſs, and want of ſpirit; and to ſuffer it to lean on either ſhoulder, argues both ſloth and indolence. Wherefore in calm and ſedate diſcourſe it ought to keep its natural ſtate, an upright poſture. However, it ſhould not be long without motion, nor yet always moving; but gently turn ſometimes on one ſide, and ſometimes on the other, as occaſions requires, that the voice may be heard by all who are preſent; and then return again to its natural poſition. It ſhould always accompany the other actions of the body, and turn on the ſame ſide with them; except when averſion to any thing is expreſt, which is done by ſtretching out the right hand, and turning the head to the left. The ancients erected a ſtatue of Venus in this poſture, who was called by the Greeks αποστροφια, and by the Latins *Verticordia*, and in Engliſh may be termed the *forbidding Venus*. But nothing is more indecent, than violent motions and agitations of the head. And therefore, when a witty writer, who is well known among us, would convey the moſt ridiculous idea of a pretender to knowledge, he expreſſes it thus:

> For having three times ſhook his head
> To ſtir his wit up, thus he ſaid. Hudib.

But it is the countenance, that chiefly repreſents both the paſſions, and diſpoſition of the mind. By this we expreſs love, hatred; joy, ſorrow; modeſty, and confidence: by this we ſupplicate, threaten, ſooth, invite, forbid, conſent, or refuſe; and all this without ſpeaking. Nay, from hence we form a judgment not only of a perſon's preſent temper, but of his capacity and natural diſpoſition. And therefore it is common to ſay, *ſuch an one has a promiſing countenance*, or *that he promiſes little by his countenance*. It is true, this is no certain rule of judging; nor is it in the power of any one to alter the natural make of his countenance: however, it may put us upon endeavouring to gain the moſt pleaſing aſpect we can; ſince it is ſo natural for mankind to draw ſuch concluſions from it; and ſome perſons are ſo unhappy, as to render their countenance more diſagreeable, than otherwiſe it would be, by ill habits.

But the ſeveral parts of the face bear their part, and contribute to the proper and decent motion of the whole. In a calm and ſedate diſcourſe, all the features retain their natural ſtate and ſituation. In ſorrow, the forehead and eyebrows lour, and the cheeks hang down. But in expreſſions of joy and chearfulneſs, the forehead and eyebrows are expanded, the cheeks contracted, and the corners of the mouth drawn upwards. Anger and reſentment contract the forehead, draw the brows together, and thruſt out the lips. And terror elevates both the brows and forehead. As theſe are the natural ſigns of ſuch paſſions, the orator ſhould endeavour to conform to them.

But as the eyes are moſt active and ſignificant, it is the advice of Cicero that the greateſt care ſhould be taken in their management. And he gives this reaſon for it, "Becauſe other parts of the countenance have but few motions; whereas all the paſſions of the ſoul are expreſſed in the eyes, by ſo many different actions, which cannot poſſibly be repreſented by any geſtures of the body, if the eyes are kept in a fixed poſture." Common experience does in a great meaſure confirm the truth of this obſervation. We readily gueſs at a perſon's intention, or how he is affected to us, by his eyes. And any ſudden change or emotion of the mind is preſently followed by an alteration in the look. In ſpeaking therefore upon pleaſant and delightful ſubjects, the eyes are briſk and chearful; as, on the contrary, they ſink and are languid in delivering any thing melancholy and ſorrowful. This is ſo agreeable to nature, that before a perſon ſpeaks, we are prepared with the expectation of one or the other from his different aſpect. So likewiſe in anger, a certain vehemence and intenſeneſs appears in the eyes, which, for want of proper words to expreſs it by, we endeavour to repreſent by metaphors taken from fire, the moſt violent and rapid element, and ſay in ſuch caſes, the *eyes ſparkle*, *burn*, or are *inflamed*.

In expreſſions of hatred or deteſtation, it is natural to alter the look, either by turning the eyes aſide, or downwards. Virgil has very juſtly obſerved this: for when he deſcribes Æneas meeting with Dido in the Elyſian ſhades and addreſſing her, he repreſents her diſregard of him, by ſaying,

Diſdainfully ſhe look'd; then turning round,
Still fix'd her eyes unmov'd upon the ground.

She ſhewed her reſentment for his former treatment of her, by not vouchſafing to look on him. Indeed, the eyes are ſometimes turned downwards upon other occaſions, as to expreſs modeſty. And if at any time a particular object be addreſſed to, whatever it be, the eyes ſhould be turned that way. And therefore Philoſtratus very deſervedly ridicules a certain rhetorician as guilty of a ſoleciſm in geſture, who, upon ſaying, *O Jupiter!* turned his eyes downward; and when he ſaid, *O earth!* looked upward. A ſtaring look has the appearance of giddineſs and want of thought; and to contract the eyes, gives ſuſpicion of craft and deſign. A fixed look may be occaſioned from intenſeneſs of thought, but at the ſame time ſhews a diſregard to the audience; and a too quick and wandering motion of the eyes denotes levity and wantonneſs. A gentle and moderate motion of the eyes is therefore in common moſt ſuitable, always directed to ſome of the audience, and gradually turning from ſide to ſide with an air of reſpect and modeſty, and looking them decently in the face, as in common diſcourſe: Such a behaviour will of courſe draw an attention. As in converſation, when a perſon addreſſes us in an handſome and becoming manner, we preſently put ourſelves in a poſture to give what he ſays a proper reception. But as all the paſſions are in the moſt lively manner expreſſed in the eyes, their motions ought to vary according to the different nature of thoſe paſſions they are ſuited both to diſcover in the ſpeaker, and convey to his hearers; ſince, as the quickeſt acceſs to the mind is by the ſight, a proper well-timed look will ſometimes ſooner effect this than it can be done by words; as in diſcharging a cannon, we are ſtruck with the light before we hear the ſound.

As to the other parts of the body diſtinct from the head, the ſhoulders ought not to be elevated; for this is not only in itſelf indecent, but it likewiſe contracts the neck, and hinders the proper motion of the head. Nor, on the other hand, ſhould they be drawn down, and depreſſed; becauſe this occaſions a ſtiffneſs both to the neck and the whole body. Their natural poſture therefore is beſt, as being moſt eaſy and graceful. To ſhrug the ſhoulders has an abject and ſervile air; and frequently to heave them upwards and downwards is a very diſagreeable ſight.

A continued motion of the arms any way, is by all means to be avoided. Their action ſhould generally be very moderate, and follow that of the hands, unleſs in very pathetic expreſſions, where it may be proper to give them a more lively ſpring.

The hands need never be idle. Quintilian ſeems to think them as neceſſary and powerful in action, as Cicero does the eyes. "The hands (ſays he) without which all geſture is lame and weak, have a greater variety of motions than can well be expreſſed; for they are almoſt equal to our words. Do not we deſire with them, promiſe, call, diſmiſs, threaten, beſeech, deteſt, fear, inquire, deny? Do not they expreſs joy, ſorrow, doubt, confeſſion, penitence, meaſure, plenty, number, and time? Do not they excite, reſtrain, prove, admire, and ſhame? That in ſo great a variety of ſpeech among all nations and countries, this ſeems to me the common language of all mankind." Thus far Quintilian. Now, all bodily motion is either upward or downward, to the right or left, forward or backward, or elſe circular. The hands are employed by the orator in all theſe, except the laſt. And as they ought to correſpond with our expreſſions, ſo they ought to begin and end with them. In admiration, and addreſſes to heaven, they muſt be elevated, but never raiſed above the eyes; and in ſpeaking of things below us, they are directed downwards. Side motion ſhould generally begin from the left, and terminate gently on the right. In demonſtrating, addreſſing, and on ſeveral other occaſions, they are moved forward; and in threatening, ſometimes thrown back. But when the orator ſpeaks of himſelf, his right-hand ſhould be gently laid on his breaſt. When no other motion is neceſſary, the hands ſhould be kept about as high as the breaſt, ſo as to make near a right angle with the arm. This is not only graceful, but likewiſe the moſt eaſy poſture, and gives the leaſt ſtrain to the muſcles. They ſhould never be ſuffered to hang down, nor to loll upon the cuſhion or bar. The left hand ſhould never move alone, but accommodate itſelf to the motions of the right. In motions to the left ſide, the right hand ſhould not be carried beyond the left ſhoulder. In promiſes, and expreſſions of compliment, the motion of the hands ſhould be gentle and ſlow; but in exhortations and applauſe more ſwift. The hands ſhould generally be open; but in expreſſions of compunction and anger they may be cloſed. All finical and trifling actions of the fingers ought to be avoided; nor ſhould they be ſtretched out and expanded in a ſtiff and rigid poſture, but kept eaſy and pliable.

Neither the breaſt nor the belly ſhould be thruſt out: which in itſelf looks ungainly, and hinders the free motion of the trunk; which ought not to be kept too ſtiff and upright, but eaſy and flexible, always ſuiting itſelf to the motions of the head and hands. The feet ſhould continue ſteady, and not give the body a wavering and giddy motion by frequently ſhifting; tho' ſome perſons fall into that habit without moving their feet. Curio, a Roman orator, as Cicero tells us, was addicted to this; which occaſioned a friend of his once to paſs a joke upon him, by aſking, *Who that was talking out of a boat?* The jeſt is too plain to need explication; for every one knows the waving of a boat will give the body ſuch a motion.

The geſtures we have hitherto diſcourſed of, are ſuch as naturally accompany our expreſſions. And we believe thoſe we have mentioned, if duly attended to, will be found ſufficient to anſwer all the purpoſes of our modern pronunciation. The ancients, indeed, uſed ſeveral more vehement actions and geſtures than we are accuſtomed to; as we have formerly ſhewn. Philip the Roman orator, as Cicero informs us, did not uſe to prepare his diſcourſes; but ſpoke, as we ſay, *off-hand*. And he was wont to tell his friends, "he was never fit to talk till he had warmed his arm." He doubtleſs, therefore, uſed a more violent motion with his arms and hands than is common with us. And Cicero calls the arm projected *the orator's weapon.* Indeed, to extend or brandiſh the arm, carries in it an air of command and authority, which was not unbecoming the character of Philip, who was a perſon of the higheſt rank and quality. And therefore young orators, both among the Greeks and Romans, for a time uſed no motion of the arm, but kept it confined in their garment, as an argument of modeſty, till age and experience allowed them to uſe greater freedom. Nor was it uncommon for the ancient orators to expreſs the exceſs of their paſſions by tears. They thought nothing unbecoming that was natural; and judged it agreeable to the characters even of the braveſt men, to be touched with a ſenſe of humanity in great calamities: And therefore we find both Homer and Virgil make their greateſt heroes ſhed tears on ſome occaſions.

The other ſort of geſtures abovementioned are ſuch as ariſe from imitation; as where the orator deſcribes ſome action, or perſonates another ſpeaking. But here great care is to be taken not to over-act his part, by running into any ludicrous or theatrical mimicry. It is ſufficient for him ſo to repreſent things of this nature, as may beſt convey the image of them in a lively manner to the minds of the hearers; without any ſuch change either of his actions or voice as are not ſuitable to his own character.

CHAP. IV. *Some particular rules for the Voice and Geſture.*

31 THE ſubject of pronunciation is of ſo great importance to an orator, that it can neither be too clearly laid down, nor too ſtrongly inculcated. If we inquire into the cauſes of that ſurpriſing power it has over us, and by what means it ſo ſtrongly affects us, this may in ſome meaſure appear by reflecting on the frame and conſtitution of human nature. For our infinitely great and wiſe Maker has ſo formed us, that not only the actions of the body are ſubject to the direction of the mind; but we are likewiſe endowed with various paſſions and affections, that excite us to purſue thoſe things which make for our happineſs, and avoid others which are hurtful to us. And as we are made for ſociety, we are alſo furniſhed with ſpeech, which enables us to converſe one with another. And ſuch is the contrivance of our make, and influence of our minds upon the mechaniſm of our bodies, that we can not only communicate our thoughts to each other, but likewiſe our paſſions. For, as Cicero well obſerves, "Every motion of the mind has naturally its peculiar countenance, voice, and geſture; and the whole body, every poſition of the face, and ſound of the voice, like the ſtrings of an inſtrument, act agreeably to the impreſſion they receive from the mind." Nor is this all: but as every one is differently affected himſelf, he is capable to make the like impreſſions upon others, and excite them to the ſame motions which he feels in himſelf. As when two inſtruments are ſet to the ſame pitch, the ſtrings of the one being touched, produce in the other the like ſound. This common ſympathy in the human frame ſhews how neceſſary it is that an orator ſhould not only in general be well acquainted with the rules of pronunciation, but likewiſe know how to uſe them as occaſion requires. For a general knowledge of the rules of art is not of itſelf ſufficient to perfect an artiſt, without a further acquaintance with the particular application of them to their ſeveral caſes and circumſtances. Thus, for inſtance, it is not enough for an orator to underſtand all the beauties and ornaments of language, and which of them are ſuited to form the ſeveral kinds of ſtyle; unleſs he can likewiſe accommodate each of thoſe characters to their proper ſubject. And ſo likewiſe in pronunciation, he ought not only to know the ſeveral qualities of the voice, and proper geſtures of the body; but alſo when and where to make uſe of them. For not only different ſubjects, but alſo different parts of the ſame diſcourſe, and even particular expreſſions, often require a difference in the manner of pronunciation, both as to the voice and geſture. Having therefore treated on both theſe parts of pronunciation in general, it may not be amiſs now to conſider, how they are to be applied in each of the two reſpects laſt mentioned.

We ſhall begin with the parts of a diſcourſe, and treat of them in their natural order. And here the view and deſign of the ſpeaker in each of them will eaſily help us to ſee the proper manner of pronunciation.

Let us ſuppoſe then a perſon preſenting himſelf before an aſſembly, in order to make a diſcourſe to them. It cannot be decent immediately to begin to ſpeak ſo ſoon as ever he makes his appearance. He will firſt ſettle himſelf, compoſe his countenance, and take a reſpectful view of his audience. This prepares them for ſilence and attention. To begin preſently, and hurry on, without firſt allowing either himſelf or his hearers time to compoſe themſelves, looks as if he was rather performing a taſk, than had any deſign to pleaſe them; which will be very apt to make them as uneaſy till he has done, as he ſeems to be himſelf. Perſons commonly form ſome opinion of a ſpeaker from their firſt view of him; which prejudices them either in his favour, or otherwiſe, as to what he ſays afterwards. A grave and ſedate aſpect inclines them to think him ſerious; that he has conſidered his ſubject, and may have ſomething to offer worth their attention. A haughty and forbidding air occaſions diſtaſte, as it looks like diſreſpect. A wandering giddy countenance argues levity. A dejected drooping appearance is apt to raiſe contempt, unleſs where the ſubject is melancholy. And a chearful aſpect is a proper prelude to a pleaſant and agreeable argument.

To ſpeak low at firſt has the appearance of modeſty, and is beſt for the voice; which, by riſing gradually, will with more eaſe be carried to any pitch that may be afterwards neceſſary, without ſtraining it. However, ſome variation of the voice is always proper to give it an harmony. Nay, and ſometimes it is not improper for an orator to ſet out with a conſiderable degree of warmth, expreſſed by ſuch an elevation of the voice, and geſtures of the body, as are ſuited to repreſent the emotions of his mind. But this is not ordinarily the caſe. We have ſome few inſtances of this in Cicero; as in his oration for Roſcius Amerinus, where the heinouſneſs of the charge could not but excite his indignation againſt the accuſers. And ſo likewiſe in that againſt Piſo, and the two firſt againſt Catiline, which begin in the ſame manner, from the reſentment he had conceived againſt their perſons and conduct.

In the narration, the voice ought to be raiſed to ſomewhat an higher pitch. Matters of fact ſhould be related in a very plain and diſtinct manner, with a proper ſtreſs and emphaſis laid upon each circumſtance, accompanied with a ſuitable addreſs and motions of the body, to engage the attention of the hearers. For there is a certain grace in telling a ſtory, by which thoſe who are maſters of it ſeldom fail to recommend themſelves in converſation. The beauty of it conſiſts in an eaſy and familiar manner of expreſſion, attended with ſuch actions and geſtures as are ſuited to the nature of the things related, and help to enliven each particular circumſtance and part of the diſcourſe.

The propoſition, or ſubject of the diſcourſe, ſhould be delivered with a very clear and audible voice. For if this be not plainly heard, all that follows in proof of it cannot well be underſtood. And for the ſame reaſon, if it be divided into ſeveral parts or branches, they ſhould each be expreſſed very deliberately and diſtinctly. But as the deſign here is only information, there can be little room for geſture.

The confirmation admits of great variety, both of the voice and geſtures. In reaſoning, the voice is quick and pungent, and ſhould be enforced with ſuitable actions. And as deſcriptions likewiſe have often a place here, in painting out the images of things, the orator ſhould ſo endeavour to adapt both his voice, and the motions of his body, particularly the turn of his eyes, and action of his hands, as may beſt help the imagination of his hearers. Where he introduces another perſon ſpeaking, or addreſſes to an abſent perſon, it ſhould be with ſome degree of imitation. And in dialogue the voice ſhould alter with the parts. When he diverts from his ſubject by any digreſſion, his voice ſhould be lively and chearful; ſince that is rather deſigned for entertainment than inſtruction.

In confutation, the arguments of the adverſe party ought firſt to be repeated in a plain and diſtinct manner, that the ſpeaker may not ſeem to conceal, or avoid the force of them. Unleſs they appear trifling and unworthy of a ſerious anſwer; and then a facetious manner, both of expreſſion and geſture, may be the propereſt way to confute them. For to attempt to anſwer in a grave and ſerious manner, what is in itſelf empty and ludicrous, is apt to create a ſuſpicion of its having more in it than it really has. So when Tubero, in his accuſation of Ligarius before Cæſar, had made it part of his charge, that Ligarius was in Africa during ſome part of the civil war between Cæſar and Pompey; Cicero in his anſwer, not thinking it deſerved a ſerious reply, contents himſelf with barely mentioning it ironically. For thus he begins his defence of Ligarius: "Cæſar, my kinſman Tubero has laid before you a new crime, and till this day unheard of, that Q. Ligarius was in Africa." Every one muſt eaſily perceive, by the manner in which theſe words were pronounced, that the deſign of them was to make the charge appear ridiculous. But caution ſhould be uſed not to repreſent any argument of weight in a ludicrous way, leſt by ſo doing the ſpeaker ſhould more expoſe himſelf than his adverſary.

In the concluſion, both the voice and geſture ſhould be briſk and ſprightly, which may ſeem to ariſe from a ſenſe of the ſpeaker's opinion of the goodneſs of his cauſe, and that he has offered nothing but what is agreeable to reaſon and truth; as likewiſe from his aſſurance that the audience agree with him in the ſame ſentiments. In every undertaking that requires care and thought, perſons are apt at firſt to be ſedate and moderate; but when it is drawn to an end, and is near finiſhed, it is very natural to appear more gay. If an enumeration of the principal arguments of the diſcourſe be convenient, as it ſometimes is, where they are pretty numerous, or the diſcourſe is long; they ought to be expreſſed in the moſt clear and forcible manner. And if there be an addreſs to the paſſions, both the voice and geſture muſt be ſuited to the nature of them, of which more will be ſaid preſently.

We proceed now to the conſideration of particular expreſſions. And what we ſhall offer here, will be firſt in relation to ſingle words, then ſentences, and laſtly the paſſions.

I. Even in thoſe ſentences, which are expreſſed in the moſt even and ſedate manner, there is often one or more words which require an emphaſis and diſtinction of the voice. Pronouns are often of this kind; as, *This is the man.* And ſuch are many words, that denote the circumſtances and qualities of things. Such as heighten or magnify the idea of the thing to which they are joined, elevate the voice; as *noble*, *admirable*, *majeſtic*, *greatly*, and the like. On the contrary, thoſe which leſſen the idea, or debaſe it, depreſs the voice, or at leaſt protract the tone; of which ſort are the words *little*, *mean*, *poorly*, *contemptible*, with many others. Some tropes likewiſe, as metaphors, and verbal figures, which conſiſt in the repetition of a ſingle word, ſhould have a particular emphaſis. As when Virgil ſays of the river Araxes, *It diſdained a bridge.* And Niſus of himſelf in the ſame poet, *I, I am the man;* where the repeated word is loudeſt. This diſtinction of words, and giving them their proper emphaſis, does not only render the expreſſion more clear and intelligible; but very much contributes to the variation of the voice, and the preventing a monotony. And the different pronunciation of theſe words will alſo require a peculiar geſture. 133

II. In ſentences, regard ſhould be had to their length, and the number of their parts, in order to diſtinguiſh them by proper pauſes. The frame and ſtructure of the period ought likewiſe to be conſidered, that the voice may be ſo managed, as to give it the moſt muſical accent. Unleſs there be ſome ſpecial reaſon for the contrary, it ſhould end louder than it begins. And this difference of tone between the end of the former ſentence, and the beginning of the next, not only helps to diſtinguiſh the ſenſe, but adds to the harmony of the voice. And that the laſt ſyllables of a ſentence might become more audible and diſtinct, was doubtleſs one reaſon why the ancient rhetoricians diſlike ſhort feet at the end of a period. In an antitheſis, or a ſentence conſiſting of oppoſite parts, one contrary muſt be louder than the other. As: "*He is gone, but by a gainful remove, from* painful labour, *to* quiet reſt; *from* unquiet deſires *to happy* contentment, *from* ſorrow, *to* joy; *and from* tranſitory time, *to* immortality." In a climax, 132 34 max, or gradation, the voice ſhould riſe with it. So: "*There is no enjoyment of* property *without* government; *no* government *without a* magiſtrate; *no* magiſtrate *without* obedience; *no* obedience *where every one acts as he* pleaſes." And ſo in other gradations of a different form. As: "*Since* concord *was loſt*, friendſhip *was loſt*, fidelity *was loſt*, liberty *was loſt*, all *was loſt*." And again: "*You would pardon him whom the* ſenate *hath condemned, whom the* people of Rome *have condemned, whom* all mankind *have condemned.*" We might mention ſeveral other figurative expreſſions, which require a particular conformation and management of the voice; but theſe, we preſume, with ſome others we ſhall have occaſion to name preſently when we come to the paſſions, may be ſufficient to guide us in the reſt. But that it may appear more evidently how neceſſary a different inflection and variation of the voice is in moſt ſentences, give us leave to ſhew how Quintilian illuſtrates it, by a paſſage which he takes from Cicero. The place is the beginning of Cicero's defence for Milo, and the words are theſe: "*Altho' I am apprehenſive, it may ſeem baſe to diſcover fear when I enter upon the defence of* a moſt courageous man; *and it may appear very indecent*, when Milo diſcovers more concern for the public ſafety, than for his own, *not to ſhew a greatneſs of mind equal to his cauſe: yet this new form of the court terrifies my eyes*, which cannot diſcern the ancient manner of the forum, and former cuſtom of trials, *whatever way they look:* your bench is not ſurrounded with its uſual attendants." This ſentence conſiſts of four members. And Quintilian ſuppoſes, that though theſe words are the beginning of a ſpeech, and were accordingly expreſſed in a calm and ſubmiſſive manner; yet that the orator uſed a great deal of variety in the pronunciation of their ſeveral parts. In the firſt member (as he imagines) his voice was more elevated in expreſſing the words, *a moſt courageous man*, than in thoſe other parts of it, *I am apprehenſive it may ſeem baſe*, and, *to diſcover fear*. In the ſecond member he roſe higher in ſaying, *when Milo diſcovers more concern for the public ſafety than for his own;* and then again as it were checked himſelf in what follows, *not to ſhew a greatneſs of mind equal to his cauſe.* The beginning of the third member, carrying a reflection in it, was ſpoke with a different tone of the voice, *this new form of the court terrifies my eyes*; and the other part of it more loud and diſtinctly, *which cannot diſcern the ancient manner of the forum, and former cuſtom of trials.* And the laſt member was ſtill more raiſed and audible, *your bench is not ſurrounded with its uſual attendants.* And it muſt be ſuppoſed, that while he was ſaying this, he caſt his eyes round the aſſembly, and viewed the ſoldiers whom Pompey had placed there; which renders the expreſſion ſtill more grave and ſolemn. If this was the manner of the ancient orators, and they were ſo exact and accurate in expreſſing their periods, and the ſeveral parts of them, as we have reaſon to believe they were; it muſt have given a very great force, as well as beauty, to their pronunciation.

34 III. That the paſſions have each of them both a different voice and action, is evident from hence; that we know in what manner a perſon is affected, by the tone of his voice, though we do not underſtand the ſenſe of what he ſays, or many times ſo much as ſee him; and we can often make the ſame judgment from his countenance and geſtures. Love and eſteem are expreſſed in a ſmooth and chearful tone: but anger and reſentment with a rough, harſh, and interrupted voice; for when the ſpirits are diſturbed and ruffled, the organs are moved unequally. Joy raiſes and dilates the voice; as ſorrow ſinks and contracts it. Cicero takes notice of a paſſage in an oration of Gracchus, wherein he bewails the death of his brother, who was killed by Scipio; which in his time was thought very moving: "*Unhappy man* (ſays he), *whither ſhall I betake myſelf? where ſhall I go?* Into the capitol? *that flows with my brother's blood.* Shall I go home? *and behold my unhappy mother all in tears and deſpair?*" Though Gracchus had a very ill deſign in that ſpeech, and his view was to excite the populace againſt their governors; yet (as Cicero tells us) when he came to this paſſage, he expreſſed himſelf in ſuch moving accents and geſtures, that he extorted tears even from his enemies. Fear occaſions a tremor and heſitation of the voice; and aſſurance gives it ſtrength and firmneſs. Admiration elevates the voice, and ſhould be expreſſed with pomp and magnificence: *O ſurpriſing clemency, worthy of the higheſt praiſe and greateſt encomiums, and fit to be perpetuated in laſting monuments!* This is Cicero's compliment to Cæſar, when be thought it for his purpoſe. And oftentimes this paſſion is accompanied with an elevation both of the eyes and hands. On the contrary, contempt ſinks and protracts the voice. In the diſpute between Cicero and Cecilius, which of them ſhould accuſe Verres, Cicero puts this contemptuous queſtion to him: "How are you qualified, Cecilius, for ſuch an undertaking? I will not aſk, when you ever gave a proof of it; but when you ſo much as attempted it? Do you conſider the difficulty of managing a public cauſe?" With much more to the ſame purpoſe. Tho' ſuch kind of expreſſions require little geſture; yet ſometimes a motion of the hand may not be improper, to ſignify diſdain or averſion. We may ſuppoſe Cicero to have acted thus in his defence of Rabirius. For to ſhow his aſſurance of his client's cauſe, having uſed this expreſſion in a very audible manner, "I wiſh I had it to ſay, that Rabirius had with his own hand killed Saturninus, who was an enemy to the Roman ſtate:" ſome perſons in the crowd began to raiſe a clamour, juſt as of later times hiſſing has been practiſed on the like occaſions. Upon which Cicero immediately replies, "This noiſe does not diſturb me, but pleaſe me; ſince it ſhows, though there are ſome weak perſons, yet they are but few." Then preſently after follows the expreſſion we refer to: "Why do not you ceaſe your clamour, ſince it only diſcovers your folly, and the ſmallneſs of your number?" All exclamations ſhould be violent. When we addreſs to inanimate things, the voice ſhould be higher than when to animated beings; and appeals to heaven muſt be made in a loftier tone than thoſe to men.

Theſe few hints for expreſſing the principal paſſions, may, if duly attended to, ſuffice to direct our practice in others. Though after all, it is impoſſible to gain a juſt and decent pronunciation of voice and geſture merely from rules, without practice and an imitation of the beſt examples. Which ſhews the wiſdom

Pronuncia-tion.

dom of the ancients, in training up their youth to it, by the aſſiſtance of maſters, to form both their ſpeech and actions.

But there is one thing, which ought always to be attended to; namely, that perſons ſhould well conſider their own make and genius, eſpecially with reſpect to the paſſions. We ſeldom find, that any actor can excel in all characters; but if he performs one well, he is deficient in another: And therefore they are commonly ſo prudent as to confine themſelves to ſuch as beſt ſuit them. The caſe is the ſame in an orator; who ſhould therefore keep within thoſe bounds which nature ſeems to have preſcribed for him. Some are better fitted for action than others, and moſt for ſome particular actions rather than others; and what fits well upon one would appear very awkward in another. Every one therefore ſhould firſt endeavour to know himſelf, and manage accordingly. Though in moſt caſes, nature may be much aſſiſted and improved by art and exerciſe.

[From Profeſſor Ward's *Syſtem of Oratory*.]

Oratory ‖ Orchard.

Oratory, among the Romaniſts, a cloſet or like apartment near a bed-chamber, furniſhed with an altar, crucifix, &c. for private devotions.

ORB, in aſtronomy, denotes an hollow globe or ſphere.

Orb, in tactics, is the diſpoſing of a number of ſoldiers in circular form of defence. The orb has been thought of conſequence enough to employ the attention of the famous marſhal de Puyſegur in his art of war, who prefers this poſition to throw a body of infantry in an open country, to reſiſt cavalry, or even a ſuperior force of infantry; becauſe it is regular, and equally ſtrong, and gives an enemy no reaſon to expect better ſucceſs by attacking one place than another. Cæſar drew his whole army in this form, when he fought againſt Labienus. The whole army of the Gauls were formed into an orb, under the command of Sabinus and Cotta, when fighting againſt the Romans. The orb was generally formed ſix deep.

ORBIT, in aſtronomy, the path of a planet or comet, or the curve that it deſcribes in its revolution round its central body: thus, the earth's orbit is the curve which it deſcribes in its annual courſe round the ſun, and uſually called the *ecliptic*. See Astronomy, *paſſim*.

ORCADES, the Orkney Iſlands. See Orkney.

ORCHARD, a garden-department, conſigned entirely to the growth of ſtandard fruit-trees, for furniſhing a large ſupply of the moſt uſeful kinds of fruit.

In the orchard you may have, as ſtandards, all ſorts of apple-trees, moſt ſorts of pears and plums, and all ſorts of cherries: which four ſpecies are the capital orchard fruits; each of them compriſing numerous valuable varieties. But to have a complete orchard, you may alſo have quinces, medlars, mulberries, ſervice-trees, filberts, Spaniſh nuts, berberries; likewiſe walnuts and cheſnuts; which two latter are particularly applicable for the boundaries of orchards, to ſcreen the other trees from the inſults of impetuous winds and cold blaſts. All the trees ought to be arranged in rows from 20 to 30 feet diſtance, as hereafter directed.

But ſometimes orchards conſiſt intirely of apple-trees, particularly in the cyder-making counties, where they are cultivated in very great quantities in large fields, and in hedge-rows, for the fruit to make cyder for public ſupply.

And ſometimes whole orchards of very conſiderable extent are entirely of cherry-trees. But in this caſe, it is when the fruit is deſigned for ſale in ſome great city, as London, &c. for the ſupply of which city, great numbers of large cherry-orchards are in ſome of the adjacent counties, but more particularly in Kent, which is famous for very extenſive cherry-orchards; many of which are entirely of that ſort called *Kentiſh cherry*, as being generally a great bearer; others are ſtored with all the principal ſorts of cultivated cherries, from the earlieſt to the lateſt kinds. See Prunus *Ceraſus*.

A general orchard, however, compoſed of all the before-mentioned fruit-trees, ſhould conſiſt of a double portion of apple-trees or more, becauſe they are conſiderably the moſt uſeful fruit, and may be continued for uſe the year round.

The utility of a general orchard, both for private uſe and profit, ſtored with the various ſorts of fruit-trees, muſt be very great, as well as afford infinite pleaſure from the delightful appearance it makes from early ſpring till late in autumn: In ſpring the various trees in bloſſom are highly ornamental; in ſummer, the pleaſure is heightened by obſerving the various fruits advancing to perfection; and as the ſeaſon advances, the mature growth of the different ſpecies arriving to perfection, in regular ſucceſſion, from May or June, until the end of October, muſt afford exceeding delight, as well as great profit.

Of the proper Extent, Situation, and Soil, for this Department.] As to the proper extent of ground for an orchard, this muſt be proportioned, in ſome meaſure, to the extent of land you have to work on, and the quantity of fruit required either for private uſe or for public ſupply: ſo that an orchard may be from half an acre to 20 or more in extent.

With reſpect to the ſituation and aſpect for an orchard, we may obſerve very thriving orchards both in low and high ſituations, and on declivities and plains, in various aſpects or expoſures, provided the natural ſoil is good: we ſhould, however, avoid very low damp ſituations as much as the nature of the place will admit; for in very wet ſoils no fruit trees will proſper, nor the fruit be fine: but a moderately low ſituation, free from copious wet, may be more eligible than an elevated ground, as being leſs expoſed to tempeſtuous winds; though a ſituation having a ſmall declivity is very deſirable, eſpecially if its aſpect incline towards the eaſt, ſouth-eaſt, or ſoutherly, which are rather more eligible than a weſterly aſpect; but a north aſpect is the worſt of all for an orchard, unleſs particularly compenſated by the peculiar temperament or good quality of the ſoil.

And as for ſoil, any common field or paſture that produces good crops of corn, graſs, or kitchen-garden vegetables, is ſuitable for an orchard, if it ſhould prove of a loamy nature, it will be a particular advantage: any ſoil, however, of a good quality, not too light and dry, or too heavy, ſtubborn, or wet, but of a medium nature, of a ſoft, pliant temperature, not leſs than one ſpade deep of good ſtaple, will be proper for this purpoſe.

Preparation of the Ground.] The preparation of the ground for the reception of trees, is by trenching; or, if for very conſiderable orchards, by deep ploughing; but trench-digging, one or two ſpades, as the ſoil will admit, is the moſt eligible, either wholly, or only for the preſent in the places where the lines of trees are to ſtand, a ſpace of ſix or eight feet wide, all the way in each row, eſpecially if it be graſs-ground, and intended to be kept in the ſwaird; or if any under-crops are deſigned to be raiſed, the ground may be wholly trenched at firſt: in either caſe trench the ground in the uſual way to the depth of the natural ſoil; and if in graſs, turn the ſward clean to the bottom of each trench, which, when rotted, will prove an excellent manure.

In planting orchards, however, on graſs-grounds, ſome only dig pits for each tree, capacious enough for the reception of the roots, looſening the bottom well, without the labour of digging any other part of the ground.

The ground muſt be fenced ſecurely againſt cattle, &c. either with a good ditch and hedge, or with a paling-fence, as may be moſt convenient. See HEDGE.

Method of planting the Trees.] The beſt ſeaſon for planting all the ſorts of fruit-trees is autumn, ſoon after the fall of the leaf, from about the latter end of October until December; or indeed it might be performed any time in open weather from October until March.

Chooſe principally full ſtandards, with ſtraight clean ſtems, ſix feet high; each with a branchy well-formed head, of from two or three to four or five years growth; and let ſeveral varieties of each particular ſpecies be choſen, that ripen their fruit at different times, from the earlieſt to the lateſt, according to the nature of the different ſorts, that there may be a proper ſupply of every ſort regularly during their proper ſeaſon. Of apples and pears in particular, chooſe a much greater quantity of the autumnal and late-ripening kinds than of the early ſorts; but moſt of all of apples: for the ſummer-ripening fruit is but of ſhort duration, only proper for temporary ſervice; but the later-ripening kinds keep ſound ſome conſiderable time for autumnal uſe; and the lateſt ſorts that ripen in October, continue in perfection for various uſes all winter, and ſeveral ſorts until the ſeaſon of apples come again.

Having made choice of the proper ſorts, and marked them, let them be taken up with the utmoſt care, ſo as to preſerve all their roots as entire as poſſible; and when taken up, prune off any broken or bruiſed parts of the roots, and juſt tip the ends of the principal roots, in general, with the knife, on the under ſide, with a kind of ſlope outward.

If the trees have been already headed, or ſo trained as to have branched out into regular ſhoots to form each a proper head, they muſt be planted with the ſaid heads entire, only retrenching or ſhortening any irregular or ill-placed ſhoot that takes an aukward direction, or grows acroſs its neighbours, or ſuch as may run conſiderably longer than all the reſt, &c.

The arrangement of the trees in the orchard muſt be in rows, each kind ſeparate, at diſtances according to the nature of growth of the different ſorts; but for the larger growing kinds, ſuch as apples, pears, plums, cherries, &c. they ſhould ſtand from 25 to 30 or 40 feet every way aſunder, though 25 or 30 feet at moſt is a reaſonable diſtance for all theſe kinds.

Each ſpecies and its varieties ſhould generally be in rows by themſelves, the better to ſuit their reſpective modes of growth: tho' for variety, there may be ſome rows of apples and pears arranged alternately, as alſo of plums and cherries; and towards the boundaries there may be ranges of leſſer growth, as quinces, medlars, filberts, &c. and the outer row of all may be walnut-trees, and ſome cheſnuts, ſet pretty cloſe to defend the other trees from violent winds.

According to the above diſtances, proceed to ſtake out the ground for making the holes for the reception of the trees; which if made to range every way, will have a very agreeable effect, and admit the currency of air, and the ſun's influence more effectually.

But in planting very extenſive orchards, ſome divide the ground into large ſquares or quarters, of different dimenſions, with intervals of fifty feet wide between; ſerving both as walks, and for admitting a greater currency of air; in different quarters planting different ſorts of fruit, as apples in one, pears in another, and plums and cherries in others, &c. and thus it may be repeated to as many quarters for each ſpecies and its varieties as may be convenient.

As to the mode of planting the trees: A wide hole muſt be dug for each tree, capacious enough to receive all the roots freely every way without touching the ſides. When the holes are all ready, proceed to planting, one tree in each hole, a perſon holding the ſtem erect, whilſt another trims in the earth, previouſly breaking it ſmall, and caſting it in equally all about the roots, frequently ſhaking the tree to cauſe the mould to ſettle in cloſe about all the ſmaller roots and fibres, and ſo as to raiſe the tree gradually up, that the crown of the roots may be but two or three inches below the general ſurface; and when the hole is filled up, tread it gently, firſt round the outſide, then near the ſtem of the tree, forming the ſurface a little hollow; and then if on the top of all is laid ſome inverted turf to the width of the holes, forming it with a ſort of circular bank, three or four inches high, it will ſupport the tree, and guard the roots from drying winds and the ſummer's drought: obſerving that each tree ſtand perfectly upright, and that they range exactly in their proper rows.

ORCHESTRA, in the ancient theatres, a place in the form of a ſemicircle, where the dancing was performed. In the Greek theatres, the orcheſtra made part of the ſtage; but, among the Romans, it anſwered nearly to our pit; only that in it were diſpoſed the ſeats for the ſenators, magiſtrates, veſtals, and other perſons of diſtinction.

ORCHIS, FOOL-STONES; a genus of the diandria order, belonging to the gynandria claſs of plants. There are a great many ſpecies; but the moſt remarkable are the following.

1. The maſcula, or male fool-ſtones, hath a root compoſed of two bulbs, crowned with oblong, broad, ſpotted leaves; upright-ſtalks, a foot high; garniſhed with one or two narrow amplexicaule leaves; and terminated by a long ſpike of reddiſh-purple flowers, having the petals reflexed backward; a quadrilobed crenated lip to the nectarium, and an obtuſe horn. The flowers of this ſpecies poſſeſs a very agreeable odour.

2. The morio, or female orchis, hath a double bulbous root, crowned with oblong, ribbed, ſpreading leaves; erect flower-ſtalks, eight or ten inches high; garniſhed with a few amplexicaule leaves; and terminated by a ſhort looſe ſpike of flowers, having connivent petals, a quadrifid crenated lip to the nectarium, and an obtuſe horn.

3. The militaris, or man-orchis, hath a double bulbous root, crowned with oblong amplexicaule leaves; erect flower-ſtalks, eight or ten inches high; terminated by a looſe ſpike of aſh-coloured and reddiſh flowers, having confluent petals; a quinquefid, rough, ſpotted lip to the nectarium, and an obtuſe horn. The ſtructure of the flowers exhibit the figure of a naked man; and are often of different colours in the ſame flower, as aſh-colour, red, brown, and dark-ſtriped.

Culture and Properties. All the orchiſes are very hardy perennials, with bulbous fleſhy roots. The flowers appear in May, June, and July, but principally in June: their mode of flowering is univerſally in ſpikes, many flowers in each ſpike; and each flower is compoſed of five petals in two ſeries, and a nectarium. The ſeaſon for removing them is in ſummer, after they have done flowering, when their leaves and ſtalks decay: plant them three inches deep, and let them remain undiſturbed ſeveral years; for the leſs they are removed, the ſtronger they will flower.

The roots of all the ſpecies have a remarkable reſemblance to the ſcrotum of animals, whence the name. This plant flouriſhes in various parts of Europe and Aſia, and grows in our country ſpontaneouſly, and in great abundance. It is aſſiduouſly cultivated in the Eaſt; and the root of it forms a conſiderable part of the diet of the inhabitants of Turkey, Perſia, and Syria. From it is made the alimentary powder called SALEP; which, prepared from foreign roots, is ſold at five or ſix ſhillings per pound, though it might be furniſhed by ourſelves at the ſixth part of that price, if we choſe to pay any attention to the culture of this plant. The orchis maſcula is the moſt valued for this purpoſe. A dry and not very fertile ſoil is beſt adapted to its growth.

The propereſt time for gathering the roots, is when the ſeed is formed, aud the ſtalk is ready to fall; becauſe the new bulb, of which the ſalep is made, is then arrived to its full maturity, and may be diſtinguiſhed from the old one, by a white bud riſing from the top of it, which is the germ of the orchis of the ſucceeding year.

The culture of the orchis is an object highly deſerving of encouragement from all the lovers of agriculture. And as the root, if introduced into common uſe, would furniſh a cheap, wholeſome, and moſt nutritious article of diet, the growth of it would be ſufficiently profitable to the farmer. See SALEP.

ORDEAL, an ancient form of trial. See TRIAL.

It was peculiarly diſtinguiſhed by the appellation of *judicium Dei;* and ſometimes *vulgaris purgatio,* to diſtinguiſh it from the canonical purgation, which was by the oath of the party. This was of two ſorts, either fire-ordeal, or water-ordeal; the former being confined to perſons of higher rank, the latter to the common people. Both theſe might be performed by deputy: but the principal was to anſwer for the ſucceſs of the trial; the deputy only venturing ſome corporal pain, for hire, or perhaps for friendſhip.

Fire-ordeal was performed either by taking up in the hand, unhurt, a piece of red-hot iron, of one, two, or three pounds weight; or elſe by walking, barefoot, and blindfold, over nine red-hot ploughſhares, laid lengthwiſe at unequal diſtances: and if the party eſcaped being hurt, he was adjudged innocent; but if it happened otherwiſe, as without colluſion it uſually did, he was then condemned as guilty. However, by this latter method queen Emma, the mother of Edward the Confeſſor, is mentioned to have cleared her character, when ſuſpected of familiarity with Alwyn biſhop of Wincheſter.

Water-ordeal was performed, either by plunging the bare arm up to the elbow in boiling-water, and eſcaping unhurt thereby: or by caſting the perſon ſuſpected into a river or pond of cold water; and, if he floated therein without any action of ſwimming, it was deemed an evidence of his guilt; but, if he ſunk, he was acquitted. It is eaſy to trace out the traditional relics of this water-ordeal, in the ignorant barbarity ſtill practiſed in many countries to diſcover witches, by caſting them into a pool of water, and drowning them to prove their innocence. And in the Eaſtern empire the fire-ordeal was uſed to the ſame purpoſe by the emperor Theodore Laſcaris; who, attributing his ſickneſs to magic, cauſed all thoſe whom he ſuſpected to handle the hot iron: thus joining (as has been well remarked) to the moſt dubious crime in the world, the moſt dubious proof of innocence.

And indeed this purgation by ordeal ſeems to have been very ancient, and very univerſal in the times of ſuperſtitious barbarity. It was known to the ancient Greeks: for in the Antigone of Sophocles, a perſon, ſuſpected by Creon of a miſdemeſnor, declares himſelf ready "to handle hot iron, and to walk over fire," in order to manifeſt his innocence; which, the ſcholiaſt tells us, was then a very uſual purgation. And Grotius gives us many inſtances of water-ordeal in Bithynia, Sardinia, and other places. There is alſo a very peculiar ſpecies of water-ordeal, ſaid to prevail among the Indians on the coaſt of Malabar; where a perſon accuſed of any enormous crime is obliged to ſwim over a large river abounding with crocodiles, and, if he eſcapes unhurt, he is reputed innocent. As in Siam, beſides the uſual methods of fire and water ordeal, both parties are ſometimes expoſed to the fury of a tiger let looſe for that purpoſe: and, if the beaſt ſpares either, that perſon is accounted innocent; if neither, both are held to be guilty; but if he ſpares both, the trial is incomplete, and they proceed to a more certain criterions.

One cannot but be aſtoniſhed at the folly and impiety of pronouncing a man guilty, unleſs he was cleared by a miracle; and of expecting that all the powers of nature ſhould be ſuſpended, by an immediate interpoſition of Providence to ſave the innocent, whenever it was preſumptuouſly required. And yet in England, ſo late as king John's time, we find grants to the biſhops and clergy to uſe the *judicium ferri, aquæ, et ignis*. And, both in England and Sweden, the clergy preſided at this trial, and it was only performed in the churches or in other conſecrated ground: for which Stiernhook gives the reaſon, *Non defuit illis operæ et laboris pretium; ſemper enim ab ejuſmodi judicio aliquid lucri ſacerdotibus obveniebat.* But, to give it its due praiſe, we find the canon law very early declaring againſt trial by ordeal, or *vulgaris purgatio*, as being the fabric of the devil, *cum ſit contra præceptum Domini, Non tentabis Dominum Deum tuum.* Upon this authority, though the canons themſelves were of no validity in England, it was thought proper (as had been done in Denmark above a century before) to diſuſe and aboliſh this trial entirely in our courts of juſtice, by an act of parliament in 3 Hen. III. according to Sir Edward Coke, or rather by an order of the king in council.

ORDER, in architecture, is a ſyſtem of the ſeveral members, ornaments, and proportions of columns and pilaſters; or a regular arrangement of the projecting parts of a building, eſpecially the column, ſo as to form one beautiful whole. See ARCHITECTURE, n°41, &c.

ORDER is alſo uſed for a diviſion, or claſs of any thing: thus the tribe of animals called *birds*, is ſubdivided into ſix orders. See ORNITHOLOGY, ZOOLOGY, &c.

Holy ORDERS, a character peculiar to eccleſiaſtics, whereby they are ſet apart for the miniſtry. See ORDINATION.

Military ORDERS, are companies of knights, inſtituted by kings and princes, either for defence of the faith, or to confer marks of honour, and make diſtinctions among their ſubjects.

Religious ORDERS, are congregations or ſocieties of monaſtics, living under the ſame ſuperior, in the ſame manner, and wearing the ſame habit.

ORDERS, in a military ſenſe, all that is lawfully commanded by ſuperior officers. Orders are given out every day, whether in camp, garriſon, or on a march, by the commanding officer; which orders are afterwards given to every officer in writing by their reſpective ſerjeants.

ORDINAL, a book containing the order or manner of performing divine ſervice.

ORDINAL *Numbers*, thoſe which expreſs order; as 1ſt, 2d, 3d, &c.

ORDINANCE, or ORDONNANCE, a law, ſtatute, or command of a ſovereign or ſuperior: thus the acts of parliament are ſometimes termed ordinances of parliament.

ORDINARY, in general, ſignifies common, uſual; thus, an ambaſſador or envoy in ordinary, is one ſent to reſide ſtatedly, and for a number of years, in the court of ſome foreign prince or ſtate, in order to keep up a good underſtanding, and watch over the intereſt of his own nation.—This term is alſo applied to ſeveral officers in the king's houſehold, who attend on common occaſions. Thus we ſay, phyſician in ordinary, &c.

ORDINARY, or *Honourable* ORDINARY, in heraldry, a denomination given to certain charges properly belonging to that art. See HERALDRY, p. 3588.

ORDINATES, in geometry and conics, are lines drawn from any point of the circumference of an ellipſis or other conic ſection, perpendicularly acroſs the axis, to the other ſide. See CONIC *Sections*.

ORDINATION, the act of conferring holy orders, or of initiating a perſon into the prieſthood by prayer and the laying on of hands.

Ordination has always been eſteemed the principal prerogative of biſhops, and they ſtill retain the function as a mark of ſpiritual ſovereignty in their dioceſe. Without ordination, no perſon can receive any benefice, parſonage, vicarage, &c. A clerk muſt be 23 years of age before he can have any ſhare in the miniſtry; and 24 before he can be ordained, and by that means be permitted to adminiſter the ſacrament. A biſhop, on the ordination of clergymen, is to examine them in the preſence of the miniſters who aſſiſt him at the impoſition of hands; and in caſe any crime, as drunkenneſs, perjury, forgery, &c. be alleged againſt any one that is to be ordained, either prieſt or deacon, the biſhop ought to deſiſt from ordaining him. The perſon to be ordained is to bring a teſtimonial of his life and doctrine to the biſhop, and give account of his faith in Latin, and both prieſts and deacons are obliged to ſubſcribe the 39 articles.

The ordination-days in the church of England, are the four Sundays immediately following the Emberweeks, *viz.* the firſt Sunday in Lent, Trinity-Sunday, and the Sundays following the firſt Wedneſday after September 14. and December 13.

In Scotland, where there are no biſhops, the power of ordination is lodged in the preſbytery. See PRESBYTERY.

ORDNANCE, a general name for all ſorts of great guns uſed in war. See GUNNERY.

Boring of ORDNANCE. Till within theſe 10 years, iron ordnance were caſt with a cylindrical cavity, nearly of the dimenſions of the caliber of the piece, which was afterwards enlarged to the proper caliber by means of ſteel-cutters fixed into the dog-head of a boring-bar iron. Three ſide-cutters equidiſtant were requiſite to preſerve the caliber ſtraight and cylindrical; and a ſingle cutter was uſed at the end of the bar to ſmooth the breech of the piece. In boring ordnance caſt hollow, the piece was fixed upon a carriage that could be moved backwards and forwards in a direct line with the centre of a water-wheel; in this centre was fixed the boring bar, of a ſufficient length to reach up to the breech of the piece, or more properly to the further end of the caliber. The carriage with the piece being drawn backwards from the centre of the water-wheel to introduce the boring and finiſhing bars and cutters, it is then preſſed forwards upon this bar by means of levers, weights, &c. and the water-wheel being ſet agoing, the bar and fullers are turned round, and clean out and ſmooth the caliber to its proper dimenſions.

Experience at laſt pointed out many inconveniences ariſing from the method of caſting guns *hollow*, and widening the calibers by theſe boring bars. For the body of iron of the hollow gun, being, at caſting, in contact with the core that made the caliber within-ſide, and with the mould without-ſide, began to conſolidate towards theſe ſides in the firſt place, ſooner than in the intermediate ſpace, where of courſe the contraction of the iron takes place; by which means, all guns caſt hollow became more or leſs ſpongy where they ought to have been moſt compact; and numberleſs cavities alſo were created round the cores, from ſtagnated air generated in them, which were too deep to be cut out by the boring.

To remedy theſe defects, iron ordnance is now univerſally caſt ſolid, by which means the column of iron is greatly enlarged, and the grain more compreſſed; and the contraction of the iron becomes in the heart of the column, and conſequently is cut out by the perforation for the caliber.

Plate CXXXII.

Guns are bored out of the ſolid reverſely from the hollow method. The piece A is placed upon two ſtandards BB, by means of two journeys, turned round by the water-wheel C, the breech D being introduced into the centre of the wheel, with the muzzle towards the ſliding carriage E, which is preſſed forwards by a rach F, and weights in the ſame way as the gun-carriage was in hollow boring. Upon this ſliding carriage is fixed, truly horizontal and centrical to the gun, the drill-bar G, to the end of which is fixed a carp's-tongue drill or cutter H; which, being preſſed forward upon the piece whilſt it is turning round, perforates the bore, which is afterwards finiſhed with bars and cutters as the hollow guns were. The principal difficulty of perforated ſolid guns truly centrical, ariſes from the contraction of the iron above-mentioned; which, reſiſting the drill unequally, tends to throw it out of the centrical line.

Office of ORDNANCE, an office kept within the tower of London, which ſuperintends and diſpoſes of all the arms, inſtruments, and utenſils of war, both by ſea and land, in all the magazines, garriſons, and forts, in Great Britain.

The officers of the ordnance are, 1. The maſter-general, from whom are derived all orders and diſpatches relating to the ſame. 2. The lieutenant-general, who receives orders from the maſter-general, and ſees them duly executed; orders the firing of guns on days of rejoicing, and ſees the train of artillery fitted out when ordered to the field. 3. The ſurveyor-general, who has the inſpection of the ordnance, ſtores, and proviſions of war in the cuſtody of the ſtore-keepers: he allows all bills of debt, keeps a check on labourers, &c. 4. The treaſurer, through whoſe hands paſſes the money of the whole office, as well for payment of ſalaries as debentures; as alſo a clerk of the ordnance, and a clerk of deliveries.

ORDONNANCE, in architecture, is the compoſition of a building, and the diſpoſition of its parts, both with regard to the whole, and to one another; or, as Mr Evelyn expreſſes it, determining the meaſure of what is aſſigned to the ſeveral apartments. Thus ordonnance is the judicious contrivance of the plan or mould; as when the court, hall, lodgings, &c. are neither too large nor too ſmall, but the court affords convenient light to the apartments about it: the hall is of fit capacity to receive company; and the bedchamber, &c. of a proper ſize. When theſe diviſions are either too great or too ſmall, with reſpect to the whole, as where there is a large court to a little houſe, or a ſmall hall to a magnificent palace, and the fault is in the ordonnance. See ARCHITECTURE.

ORDONNANCE, in painting, is uſed for the diſpoſition of the parts of a picture, either with regard to the whole piece, or to the ſeveral darts, as the groups, maſſes, contraſts, &c. See PAINTING, n° 14.

ORE, in natural hiſtory, the compound mineral glebe, earth, ſtone, or other ſubſtance, which is ſufficiently rich in metallic particles to be worth the while of purification, and by this means of ſeparating the metal from it, whether gold, ſilver, copper, &c. See METALLURGY, Part i. ſect. 2.

ORENSE, an ancient town of Spain, in the kingdom of Galicia, with a biſhop's ſee. It is famous for its hot-baths; and is ſeated at the foot of a mountain, on the river Minho, over which there is a handſome bridge of one arch. W. Long. 7. 27. N. Lat. 42. 16.

ORESTES, in ancient hiſtory, king of Mycenæ, was the ſon of Agamemnon and Clytemneſtra. At the inſtigation of his ſiſter Electra, he revenged the death of his father, and did not even ſpare his own mother. He alſo killed Pyrrhus the ſon of Achilles, for taking away Hermione, who had been promiſed to him in marriage. It is ſaid, that, after he had killed his mother, he went diſtracted; and that, to expiate his crime, he was obliged to go to the temple of Diana in the Cherſoneſus Taurica. His friend Pylades accompanied him thither: when king Thoas reſolving to ſacrifice him to Diana, to whom human victims were offered, Pylades reſolving to be ſacrificed to ſave his friend, aſſured that prince that he was Oreſtes; while Oreſtes, on the contrary, to prevent the death of Pylades, maintained that he alone was the true Oreſtes. During this generous conteſt, which rendered the friendſhip of Oreſtes and Pylades the admiration of the world, Iphigenia, who preſided at Diana's ſacrifices, knew again her brother Oreſtes, and delivered him from the danger to which he was expoſed. Some days afterwards, Oreſtes, accompanied by Pylades, ſlew king Thoas, ſeized his treaſures, and took his ſiſter Iphigenia with him into Arcadia, 1144 B. C.

ORFA, a conſiderable town of Diarbeck in Aſia, very pleaſantly ſituated, pretty large, and well fortified. It formerly belonged to Perſia; but is now in the Turkiſh dominions, and is a place of very good trade. It has a ſtately caſtle ſtanding on a hill, which makes a great ſhew at a diſtance. They pretend to ſhew the well where Rachel watered her father's camels when Jacob met her, and they call it *Abraham's well*. E. Long. 37. 45. N. Lat. 36. 20.

ORFORD, a town of Suffolk in England, ſeated on the ſea-coaſt between two channels. It was formerly a good fiſhing-town, but has now loſt its trade; however, it has the title of an *earldom*, and ſends two members to parliament. Here is a handſome church, whoſe ſteeple is a good ſea-mark; and near it are the ruins of an old caſtle, and an holy houſe, where the ſeamens wives uſed to pray for the ſafety of their huſbands. E. Long. 1. 33. N. Lat. 52. 15.

ORGAGNA (Andrea), an excellent Italian painter, was born at Florence in 1329. In his youth he learned ſculpture; he was alſo a poet and an architect. He had a fruitful genius, and his manner reſembled that of the other painters of his time. Moſt of his works are at Piſa. The moſt admired of them is his picture of the Laſt Judgment, in which he painted his friends

Plate CCXXXII.

Fig. 1.

Boring of

ORDNANCE.

D *Breech of the Gun.*
G *Drill Bar.*
H *Carps Tongue Cutter.*

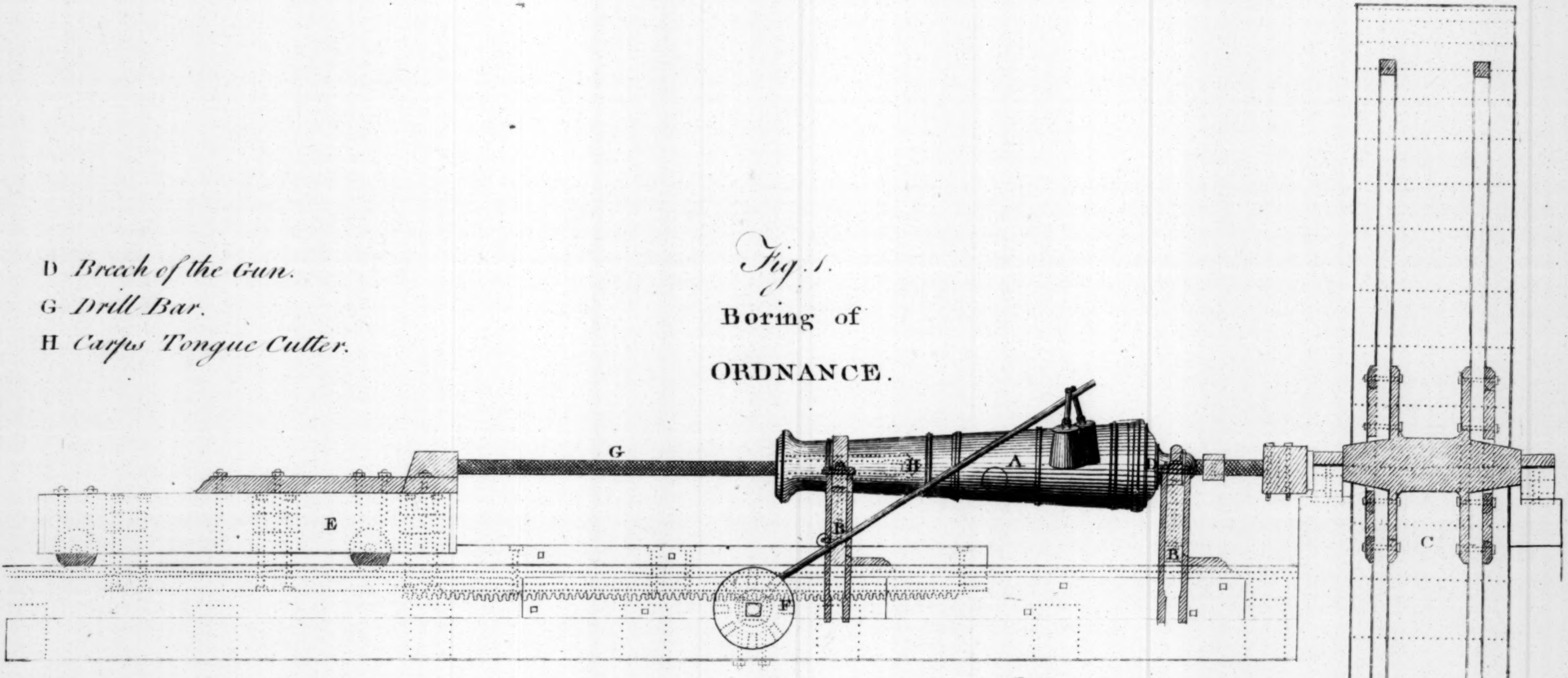


Fig. 2.

PENDULUM.

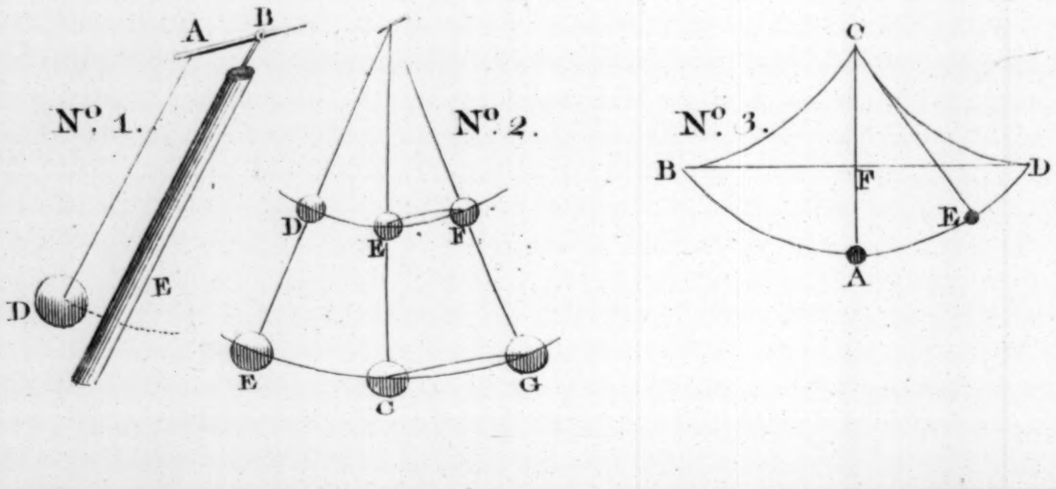
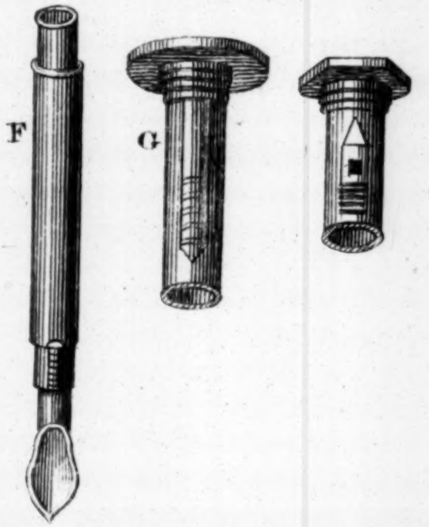

A
B
Nº. 1.
D
E
Nº. 2.
D
E
F
E
C
G
Nº. 3.
C
B
F
D
E
A

Fig. 3. Fountain

PEN.



A Bell Sculp!

3 MA 53

3 MA 55

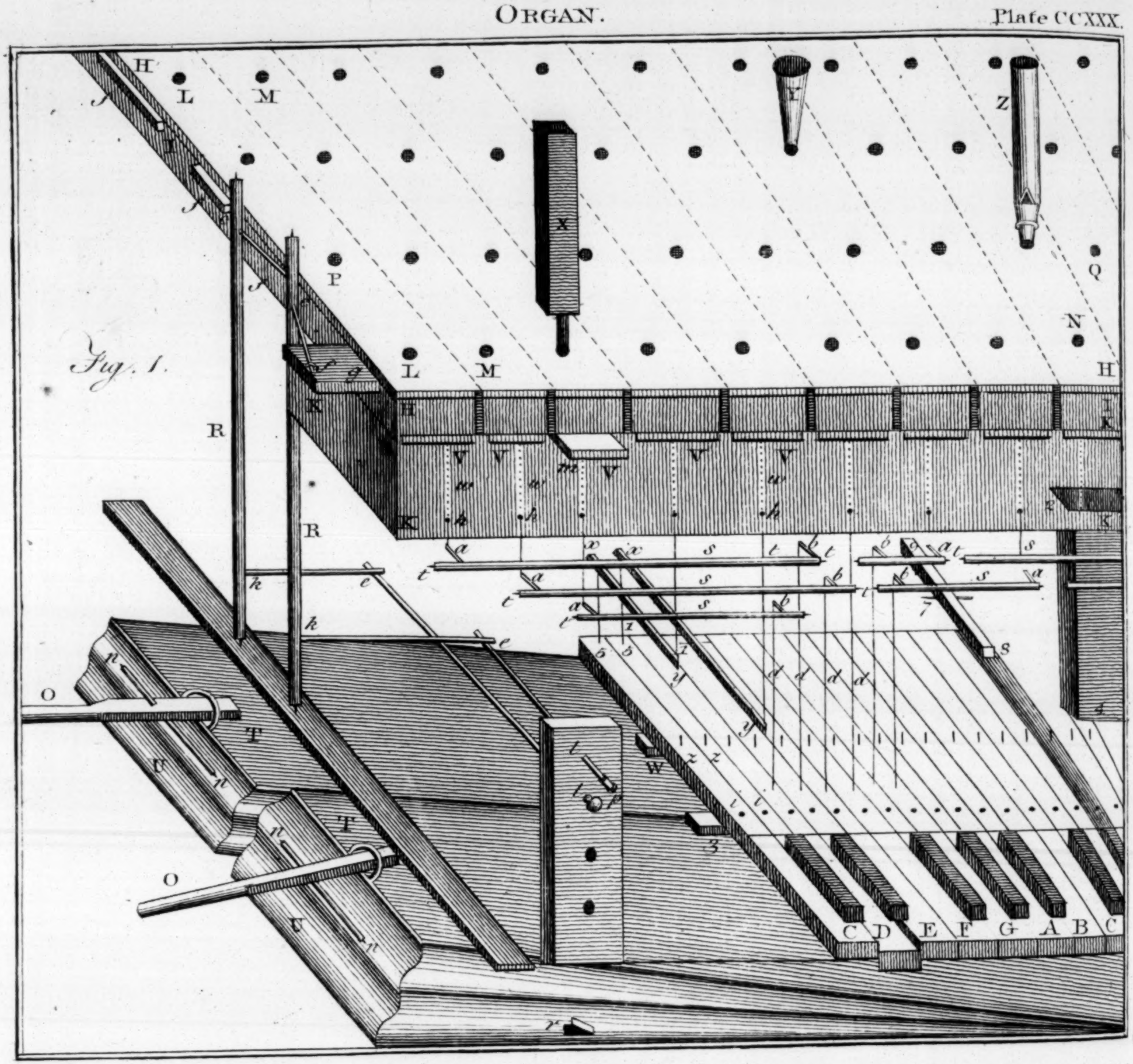


Fig. 1.
H
L
M
X
Y
Z
P
Q
N
R
K
V
w
h
a
s
t
b
x
e
k
O
T
U
n
W
3
C
D
E
F
G
A
B

Fig. 2.

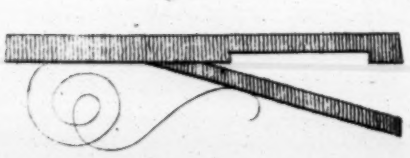


Fig. 3.

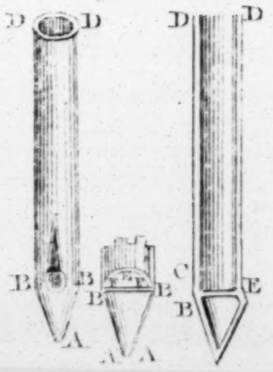


Fig. 4.

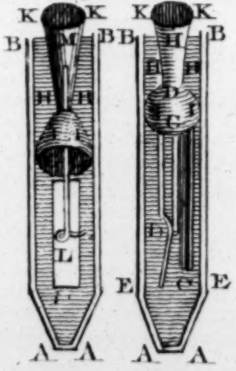
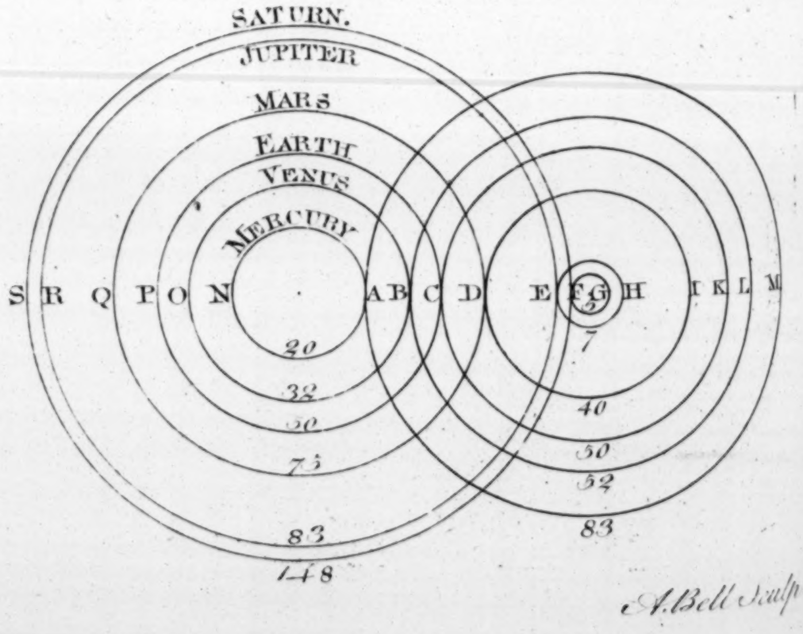


Fig. 5. ORRERY.


SATURN.
JUPITER
MARS
EARTH
VENUS
MERCURY
S R Q P O N
A B C D E F G H I K L M
20
32
50
75
83
148
5
7
40
50
52
83

A. Bell Sculp^t

friends among the bleſſed, and his foes in hell. He died in 1389.

ORGAL, among dyers, denotes the lees of wine dried.

ORGAN, in general, is an inſtrument or machine deſigned for the production of ſome certain action or operation; in which ſenſe the mechanic powers, machines, and even the veins, arteries, nerves, muſcles, and bones of the human body, may be called *organs*.

ORGAN, in muſic, the largeſt and moſt harmonious wind-inſtrument.

The invention of the organ is very ancient; though it is agreed that it was little uſed till the eighth century. It ſeems to have been borrowed from the Greeks. Vitruvius deſcribes an hydraulic one in his tenth book of Architecture. The emperor Julian has an epigram in its praiſe. St Jerom mentions one with twelve pair of bellows, which might be heard a thouſand paces, or a mile; and another at Jeruſalem, which might be heard at the mount of Olives.

The church-organ conſiſts of two parts; the main body, called the *great organ*; and the poſitive or *little organ*, which forms a ſmall caſe or buffet, commonly placed before the great organ. The ſize of an organ is generally expreſſed by the length of its largeſt pipe: thus they ſay, an organ of 8, 16, 32 feet, *&c.* The organ in the cathedral church at Ulm in Germany is 93 feet high, and 28 broad: its largeſt pipe is 13 inches diameter, and it has 16 pair of bellows.

te XXX. g. 1.

The ſeveral parts of the church-organ are as follow. HIH is the ſound-board: which is compoſed of two parts, the upper board or cover HHH, and the under board HI, which is much thicker than the other; each of theſe conſiſts of ſeveral planks laid with their edges to each other, and joined very cloſe together. In the under-ſide of the lower board there are made ſeveral channels, which run in the direction LL, MM, &c. and are continued as far as there are ſtops in the organ, and come almoſt to the edge HK. Theſe channels are covered over very cloſe with parchment or leather all the way, except a hole that is commonly at the fore-end next HK, upon which a valve or puff is placed. Theſe channels are called *partitions*. When this valve or flap is ſhut it keeps out the air, and admits it when open. On the upper ſide of the lower board there are likewiſe cut ſeveral broad ſquare channels, lying croſs the former, but not ſo deep as to reach them; theſe lie in the direction LN, PQ, &c. To fit theſe channels, there are the ſame number of wooden ſliders or regiſters *f, f, f*, &c. running the whole length; and theſe may be drawn out or thruſt in at pleaſure. The number of theſe is the ſame as that of the ſtops in the organ.

IKKK is the wind-cheſt, which is a ſquare box fitted cloſe to the under ſide of the lower board, and made air-tight, ſo that no air can get out but what goes through the valves along the partitions.

VV are the valves or puffs which open into the wind-cheſt; they are all incloſed in it, and may be placed in any part of it, as occaſion ſhall require. One of theſe valves, with the ſpring that ſhuts it, and the wire that opens it, is repreſented by fig. 2.

C, D, E, F, &c. are the keys on which the fingers are placed when the organ is played: theſe keys lie over the horizontal bar of wood W, in which are ſtuck an equal number of wire-pins *z, z*, on which keys are fixed; and the keys move up and down on the bar, as on a centre. There is another bar, againſt which the keys fall when put down, and which is here marked 3: on this alſo are ſeveral wires, which go through the keys, to guide them; and on this bar a liſt is faſtened to hinder the keys from knocking againſt the wood.

The keys are made to communicate with the valves ſeveral ways, as we ſhall now deſcribe. Firſt, *s, s, s*, are the key-rollers, moving on the pivots *t, t*: theſe rollers lie horizontally, one above another, and are of ſuch a length as to reach from the valve to the key: *a, a, a*, are arms or levers fixed to the key-rollers: *w, w*, the valve-wires fixed to the arms *a, a*, and to valves V, and go through the holes *b, b*, in the bottom of the wind-cheſt: *b, b, b*, are likewiſe arms fixed to the key-rollers: *d, d, d*, the key-wires, fixed to the arms *b, b*, and to the keys C, D, E. Now, when the end of any one of the keys C, D, E, is put down, it pulls down the arm *b*, by the wire *d*, which turns about the roller *s* with the arm *a*, that pulls down the wire *w*, which opens the valve that is ſhut by the ſpring as ſoon as the preſſure is taken off the key. In this conſtruction there muſt be a worm-ſpring faſtened to the key, and to the bar W on the further ſide, to keep down the end 5 of the key.

Another method of opening the valves is thus: *xy, xy*, are ſlender levers, moveable on the centres 1, 1; 5 *x*, 5 *x*, are wires going from the further ends of the keys to the ends *x* of the levers; *y* V, *y* V, are other wires, reaching from the ends *y* of the levers, through the holes *h*, to the valves V. So that putting down the key C, D, &c. raiſes the end 5, which thruſts up the end *x* of the lever, by the wire 5 *x*; this depreſſes the end *y* of the lever, which pulls down the wire *y* V, and opens the valve V.

A third way of opening the valves is this: At the end of the key *b*, is a lever 8, 9, moving in the centre 7. This makes, with the key, a compound lever. From the end 9, a wire goes to the valve. Now the putting down the end 6 of the key, raiſes the end 8, which depreſſes the end 9, of the lever 8, 9, pulls down the wire, and opens the valve. There is only one of theſe drawn in the ſcheme, and but a few of the others, to avoid confuſion.

R, R, are the rollers, to move the ſliders, by help of the arms *cf, cf*, which are fixed horizontally in theſe rollers: *ke, ke*, are alſo levers fixed in the rollers; *le, le*, are the handles, which lie horizontally, and paſs through the holes *l, l*; they are faſtened to the lever *ke*, being moveable about a joint at *e*.

Now, any handle *lp*, being drawn out, pulls the end *e* toward *l*, which turns about R*k*, along with the arm *cf*; and the end *f* pulls out the ſlider *fg*; and when *p* is thruſt in, the arm *cf* likewiſe thruſts in the ſlider *fg*.

Upon the ſeveral rows of holes which appear on the top of the upper board, there are ſet up an equal number of rows of pipes. The pipes of an organ are of two kinds; the one has a mouth like a flute, the other with reeds. The firſt, called *pipes of mutation*, conſiſt, (1.) of a foot AABB (fig. 3.) which is a hollow cone, that receives the wind that is to ſound the pipe: (2.) To this foot is faſtened the body of the pipe BBDD. Between the foot and the body of the pipe is a diaphragm or partition FEF, that has a long but narrow aperture by which the wind comes out; over this aperture is the mouth BBC, whoſe upper lip C, being level, cuts the wind as it comes out.

The pipes are of pewter, of lead mixed with a a twelfth part of tin, and of wood. Thoſe of pewter are always open at their extremities: their diameter is very ſmall, and their ſound very clear and ſhrill. Thoſe of lead mixed with tin are larger; the ſhorteſt are open, the longeſt quite ſtopped; thoſe of a mean ſize are partly ſtopped, and have beſide a little ear on each ſide the mouth, to be drawn cloſer or ſet further aſunder, in order to raiſe or lower the ſound. The wooden pipes are ſquare, and their extremity is ſtopped with a valve or tampion of leather. The ſound of the wooden and leaden pipes is very ſoft; the large ones ſtopped are commonly of wood, the ſmall ones of lead. The longeſt pipes give the graveſt ſound, and the ſhorteſt the moſt acute: their lengths and widths are determined by a fixed proportion to their ſounds; and their diviſions are regulated by a rule, which is called the *diapaſon*. The longeſt has commonly 16 feet; but in very large organs it has 32 feet. The pedal tubes are always upon, though made of wood and of lead. Whatever note any open pipe ſounds, when its mouth is ſtopped it will ſound an octave lower; and a pipe of twice its capacity will likewiſe ſound an octave lower.

A reed-pipe conſiſts of a foot AABB, (fig. 4.) that carries the wind into the ſhallot or reed CD, which is a hollow demi-cylinder, fitted at its extremity D, into a ſort of mould, by a wooden tampion G. The ſhallot is covered with a plate of copper KKLL, fitted at its extremity II, into the mould, by the ſame wooden tampion. Its other extremity KK, is at liberty: ſo that the air entering the ſhallot makes it tremble or ſhake againſt the reed; and the longer that part of the tongue IL, which is at liberty, is made, the deeper is the ſound. The mould II, that ſerves to fix the ſhallot or reed, the tongue, tampion, &c. ſerves alſo to ſtop the foot of the pipe, and make the wind go out wholly at the reed. Laſtly, in the mould is ſoldered the tube HH, whoſe inward opening is a continuation of that of the reed: the form of this tube is different in different ranks of pipes. The degree of acuteneſs or gravity in the ſound of a reed pipe, depends on the length of the tongue, and that of the pipe CK, taken from the extremity of the ſhallot to the extremity of the tube. The quantity or intenſion of the ſound depends on the width of the reed, the tongue, and the tube; as alſo on the thickneſs of the tongue, the figure of the tube, and the quantity of wind. To diverſify the ſounds of the pipes, a valve is added to the port-vent, which makes the wind go out in fits or ſhakes. In fig. 1. X repreſents a flute-pipe of wood, Z a flute-pipe of metal, Y a trumpet-pipe of metal. The pipes, to prevent them from falling, paſs through holes made in boards, placed upon the upper board.

The pipes are made to communicate with the wind-cheſt in the following manner. There are holes bored that go through the upper and lower boards, and through the ſlider, (when it is drawn out), into the partition below; ſo that any pipes placed upon thoſe holes will then communicate with the partition, which, by its valve, communicates with the wind-cheſt. But when the ſlider is thruſt in, its holes do not anſwer to thoſe in the upper and lower boards; therefore the communication is ſtopped, ſo that no wind can get to the pipe.

To every large organ there muſt be at leaſt two pair of bellows, which are marked in fig. 1. by TU, TU. O, O, are the handles, moving upon the axis *n n*, *n n*. Each of theſe bellows conſiſts of two boards, the loweſt of which is immoveable; and in this there is a valve *r*, opening inwards, and a tube leading to it, called the *conveying tube*. There is alſo a hole in this under board, from which a tube leads to the port-vent, which is a ſquare tube marked 4, riſing upward, and inſerted into the under ſide of the wind-cheſt at 2. In the tube leading to the port-vent there is a valve that opens towards the port-vent, and ſuffers the air to go up the port-vent, but not to return. Now the handle O being pulled down, raiſes the upper board T, and the air enters through the valve *r*; and when the handle is let go, the weight of the upper board, which carries three or four pound to every ſquare foot, continually deſcending, drives the air through the port-vent to the ſound-board: and as the bellows work alternately, one pair is conſtantly deſcending, which occaſions a continual blaſt through the port-vent. In chamber-organs there is but one pair of bellows; but they are formed of three boards, in the manner of a ſmith's bellows, and ſo have a continual blaſt. All the internal ſtructure of the organ is concealed from the ſight by the front of the inſtrument, which ſtands upon the part between the numbers 3 and 6 (fig. 1.)

In every organ the number of partitions LL, MM, &c. there are in the ſound-board (fig. 1.) that of the valves V V, that of the rollers *s s*, or of the levers *x y* or 8 9 and their wires, and that of the keys ABC, &c. muſt be always equal. Large organs have commonly four or five ſets of keys, beſide thoſe that belong to the pedals or large pipes, the ſtops to which are played by the feet. The keys of an organ are uſually divided into four octaves; which are, the ſecond ſub-octave, firſt ſub-octave, middle octave, and firſt octave. Each octave is divided into 12 ſtops or frets, of which ſeven are black and five white; the former mark the natural notes, and the latter the artificial notes, that is, flats and ſharps. The number of keys, therefore, when there are four octaves, muſt be 48. Some organiſts add one or more ſtops to the firſt and ſecond ſub-octaves. The pedals have two or three octaves, at the option of the organiſt; ſo that the number of ſtops is indeterminate. The keys are placed between GG (fig. 1.), but the ſcheme could not contain them all. There are alſo as many handles *l*, *l*, &c. rollers RR, &c. ſliders *ſ*, *ſ*, &c. as there are ſtops upon the organ; and it muſt be obſerved, that between the ſliders *ſ*, *ſ*, &c. there are as many ſliders on the right hand, and the ſame number of handles and rollers, and other rows of pipes placed between LN, PQ, which could not be expreſſed in the figure.

The leaſt pipes and partitions are placed toward the middle of the organ, and the greateſt on the outſide.

The ſtops of an organ have various denominations, according to the ſounds they are to produce; ſome of which are diapaſon, principal, fifteenth, twelfth, tearce, cornet, trumpet, French horn, vox humana, flute, baſſoon, cremona, &c. There is likewiſe a contrivance to ſwell the notes of ſome of the ſtops.

When this magnificent inſtrument is played, the handle O of the bellows is firſt put down, which raiſes the upper board T, and gives room for the air to enter by the valve *r*. Then the other handle O is put down; in the mean time the board T, belonging to the firſt handle, deſcending, and ſhutting the valve *r*, drives the air through the other valve, up the port-vent, and into the wind-cheſt. Then drawing out any handle, as that of the flute-ſtop *p l*, which draws out the ſlider *fg*, all the pipes in the ſet LN are ready to play, as ſoon as the keys C,D,E, &c. are put down: therefore, if the key D be put down, it opens the correſponding valve *m* V, through which the air enters into the pipe X, and makes it ſound. In the ſame manner any other pipe in the ſet LN, will ſound when its key is put down; but no pipe, in any other ſet, will ſound till the ſlider be drawn out by its correſponding handle.

Hydraulic ORGAN, denotes a muſical machine that plays by water inſtead of wind. Of theſe there are ſeveral in Italy, in the grottos of vineyards. Cteſebes of Alexandria, who lived in the time of Ptolemy Euergetes, is ſaid to have invented organs that played by compreſſing the air with water, as is ſtill practiſed. Archimedes and Vitruvius have left us deſcriptions of the hydraulic organ.

ORGASM, an ecſtaſy, or impetuous deſire of coition, occaſioned by a turgeſcency of the ſeminal veſſels.

ORGIA, in antiquity, feaſts and ſacrifices performed in honour of Bacchus, inſtituted by Orpheus, and chiefly celebrated on the mountains by wild diſtracted women called *Bacchæ*. See BACCHANALIA, and DIONYSIA.

ORGUES, in the military art, are thick long pieces of wood, pointed at one end, and ſhod with iron, clear one of another; hanging each by a particular rope or cord, over the gateway of a ſtrong place, perpendicularly, to be let fall in caſe of the approach of an enemy.

ORGUES, is alſo uſed for a machine compoſed of ſeveral harquebuſs or muſket barrels bound together, by means whereof ſeveral exploſions are made at the ſame time. It is uſed to defend breaches and other places attacked.

ORGYA, an ancient Grecian meaſure containing ſix feet.

ORIFICE, the mouth or aperture of a tube, pipe, or other cavity.

ORIGANUM, ORIGANY, or *Marjoram*; a genus of the gymnoſpermia order, belonging to the didynamia claſs of plants. The principal ſpecies are, two hardy perennials and an annual for the open ground, and five perennials for the green-houſe: viz. 1. The vulgare, or wild pot-marjoram; 2. The heracleoticum, or winter ſweet-marjoram. Theſe are finely-ſcented aromatics, excellent for culinary purpoſes, particularly for broths, ſoups, &c. they have likewiſe merit for medical uſes, and for giving fragrance to ointments; ſo that the plants are proper both for kitchen and phyſic gardens, and may alſo be employed in the pleaſure-ground as plants of variety. 3. The marjorana, or annual ſweet marjoram, is an aromatic of the higheſt fragrance, is admirable for kitchen uſe, and excellent for noſegays; ſo is proper both for the kitchen and pleaſure garden, but more particularly the former. It is often called *knotted marjoram*, from the flowers growing in cloſe knotted-like heads. The following moſtly aſſume an underſhrubby growth; frequently with abiding ſtalks, if they have ſhelter here in winter. 4. The dictamnus, or dittany of Crete; 5. The ſipyleum, or origanum of mount Sipylus; 6. The creticum, or Cretan origany; 7. The ſmyrnæum, or Smyrna origany; 8. The Ægyptiacum, or Egyptian origany. All theſe eight ſpecies of origanum flower in July and Auguſt; the flowers are ſmall, monopetalous, ringent, univerſally hermaphrodite, and collected into verticilli round the ſtalks; ſucceeded by ripe ſeed in autumn; though in this country the annual marjoram and the three green-houſe ſorts ſeldom perfect ſeed well, unleſs the autumn proves remarkably fine and warm: in default, however, of ſeed, the propagation of all the perennial ſorts, both hardy and green-houſe kinds, is eaſily effected by ſlips of the roots, &c. And the ſeed of the annual ſort is imported plentifully from France or Italy, by the ſeed-dealers.

ORIENT, a harbour of France, in the province of Bretagne, in the bottom of the bay of St Lewis. Since the year 1720, a handſome town has been built here, where the Eaſt India company have large magazines. The Engliſh attempted to become maſters of it in 1746, but miſcarried. W. Long. 3. 22. N. Lat. 47. 45.

ORIGEN, one of the moſt celebrated eccleſiaſtical writers, greateſt geniuſes, and moſt learned men of the primitive church, during the third century, was born at Alexandria, in the year 185; and was ſurnamed *Adamantus*, either from his indefatigable application to ſtudy, or the firmneſs he diſcovered amidſt the torments he ſuffered for the faith. Leonides his father educated him with care, and made him apply to the ſtudy of the Holy Scriptures from his infancy, in which he made ſurpriſing progreſs. He had afterwards St. Clement of Alexandria for his maſter in divinity, and at 18 years of age ſucceeded that great man in the office of catechiſt, an important employment, which conſiſted in teaching divinity, and expounding the Scriptures. Leonides his father had ſuffered martyrdom the year before, during the perſecution of Severus in 202; and Origen had ſhewn ſuch eagerneſs to follow his father to martyrdom, that his mother was obliged to hide his cloaths, to prevent his going abroad. Origen had a great concourſe of auditors who attended his ſchool, ſome of whom were of the faithful, and the others pagans. He confirmed and ſtrengthened the firſt in their faith, and converted moſt of the others; and there were ſuch a number of martyrs amongſt his diſciples, that it might be ſaid, that he kept rather a ſchool of martyrdom than of divinity. He taught the doctrines of Chriſtianity to the girls and women as well as to the men; and, taking in a too literal ſenſe what Chriſt ſays of becoming voluntary eunuchs, caſtrated himſelf, to prevent his deſerving

ſerving or ſuffering ſcandal. He took a voyage to Rome in 211; and at his return publiſhed many works, by which he acquired an extraordinary reputation, that drew to him a great number of auditors. But Demetrius, biſhop of Alexandria, conceiving a jealouſy of him, endeavoured by various pretences to injure him. At length Origen went to Antioch, whither the empreſs Mammæa had ſent for him to hear him diſcourſe on the Chriſtian religion; he did not however ſtay long there, but returned to Alexandria, where he continued to teach till the year 288, when he left that city, and travelled into Achaia. In that journey he went into Paleſtine, and was ordained by the biſhops of that province at 42 years of age. His being ordianed by foreign biſhops without the permiſſion of Demetrius, renewned that prelate's reſentment againſt him; on which Origen haſtily returned to Alexandria, to endeavour to mollify him; but Demetrius drove him from thence in 231, and cauſed him to be excommunicated, and even depoſed in a council held in Egypt. Origen then retired to Cæſaria in Paleſtine, where he raiſed a celebrated ſchool, and had St Gregory Thaumaturgus, and a great number of other perſons who were illuſtrious for their virtue and learning, for his diſciples. He afterwards travelled to Athens; and then, at the deſire of Firmilianus, ſtaid ſome time at Cæſaria in Cappadocia; whence he was invited into Arabia, to convince and bring back to the truth Beryllus, biſhop of Boſtra, who maintained that the Word had no exiſtence before his incarnation. Origen had the happineſs to make him ſenſible of his miſtake; and ſome years after was ſent for into Arabia by an aſſembly of biſhops, to diſpute again the Arabians, who maintained that the ſouls of the dead remained in a ſtate of inſenſibility till the general reſurrection. At length the ſeventh perſecution of the Chriſtians began in the reign of Decius, and none were uſed with greater ſeverity than Origen. He ſupported with incredible conſtancy the dreadful torments which the perſecutors of the Chriſtians invented againſt them; torments that were the more inſupportable, as they were made to continue a long time, and as they took the greateſt care to prevent his expiring in the midſt of his tortures; but in the midſt of the moſt excruciating torments, he diſcovered an heroic courage, and ſuffered nothing to eſcape him that was unworthy a diſciple of Jeſus Chriſt. He died at Tyre in 254, aged 69. He was the author of a great number of excellent works. The principal of thoſe which have been handed down to us are, 1. A Treatiſe againſt Celſus, of which Spencer has given a good edition in Greek and Latin, with notes: this learned treatiſe has been tranſlated into French by Elias Bouhereau, a proteſtant miniſter, born at Rochelle. 2. A great number of Homilies, with Commentaries on the Holy Scriptures. 3. *Philocalia*, and ſeveral other treatiſes. 4. Fragments of his Hexaples, collected by father Montfaucon, in two volumes folio. Of all Origen's books, the loſs of the Hexaples is moſt to be regretted. This work was thus named from its containing ſix columns; in the firſt of which was the Hebrew text of the Bible; in the ſecond, the ſame text in Greek characters; in the third, the Greek verſion of the Septuagint; in the fourth, that of Aquila; in the fifth, that of Symmachus; and in the ſixth, Theodotian's Greek verſion. This admirable work gave the firſt hint for our Polyglot Bibles. 5. The book of Principles; of which we have only an incorrect Latin verſion. In all his writings he diſcovers a ſurpriſing degree of modeſty, candour, and humility; a noble and ſublime genius, profound learning, and vaſt erudition. His manners were extremely pure, and he had a warm zeal for ſpreading the truths and morals of the goſpel. The moſt complete edition of his works is that of father de la Rue, a Benedictine, in Greek and Latin.

He ought not to be confounded with another Origen, a Platonic philoſopher, and the diſciple and friend of Porphyry, who ſtudied philoſophy under Ammonius.

ORIGENISTS, in church-hiſtory, a Chriſtian ſect in the fourth century, ſo called from their drawing their opinions from the writings of Origen. The Origeniſts maintained, that the ſouls of men had a pre-exiſtent ſtate; that they were holy intelligences, and had ſinned in heaven before the body was created: that Chriſt is only the ſon of God by adoption; that he has been ſucceſſively united with all the angelical natures, and has been a cherub, a ſeraph, and all the celeſtial virtues one after another; that, in future ages, he will be crucified for the ſalvation of the devils, as he has already been for that of men; and that their puniſhment, and that of the damned, will continue only for a certain limited time.

ORIGINAL, a firſt draught or deſign of any thing, which ſerves as a model to be imitated or copied.

ORIGINAL *Sin*, the crime of eating the forbidden fruit, of which, it is ſaid, all mankind are guilty at their conception, by the imputation of Adam's tranſgreſſion; which is accounted for by ſuppoſing, that Adam, as he was to be the father, was alſo the fœderal head and repreſentative, of the whole human human race: and that, on his ſinning, all that were to ſpring from him partook of his crimes.

ORIGUELA, a town of Spain in Valentia. It is ſeated between the mountains on the banks of the river Segura, in a place fortified by nature, and in a fertile plain, abounding in all things, eſpecially corn. It is ſurrounded with pleaſant gardens, and has a univerſity and a biſhop's ſee. It is defended by an old caſtle; and is the capital of a government independent of Valentia, whoſe juriſdiction extends thirty miles in length, and fifteen in breadth. W. Long. 0. 56. N. Lat. 38. 22.

ORILLON, in fortification, is a ſmall rounding of earth, faced with a wall; raiſed on the ſhoulder of thoſe baſtions that have caſemates, to cover the cannon in the retired flank, and prevent their being diſmounted by the enemy. See FORTIFICATION.

ORIOLUS, in ornithology, a genus belonging to the order of picæ. The bill is conical, convex, very ſharp and ſtraight; the ſuperior mandible being much longer than the under one; and the tongue is forked and ſharp. There are 20 ſpecies, principally diſtinguiſhed by their colour.

ORION, in fabulous hiſtory, was the ſon of Jupiter, Neptune, and Mercury. For as theſe gods were viſiting the earth, they entered the houſe of Hyrieus, a native of Tanagra, in Bœotia, under the character of benighted travellers, on account of his being famed

Orion || Orkney.

Orkney.

for hoſpitality to ſtrangers. Hyrieus treated them in the beſt manner in his power; and even killed an ox, the only one he had, for their entertainment. At which the gods were ſo pleaſed, that they offered the old man whatever he would aſk; who letting them know that he deſired nothing ſo much as a ſon, they, to gratify his wiſh, cauſed the ox's hide to be brought before them, in which, having depoſited their urine, they bad him keep it under ground for ten months. At the expiration of that term he dug it up, and found in it an infant, whom he at firſt called *Urion*, to expreſs his origin; but afterwards changed it to Orion. He was a remarkable hunter: and Neptune gave him the power of walking on the ſurface of the waters, with the ſame ſpeed that Iphiclus did over the ears of corn; on which he croſſed from the continent of Greece to the iſland of Chios, where attemping to violate Ærope, the wife of king Oenopion, that monarch deprived him of his ſight. He than travelled to Leſbos, where he was kindly received by Vulcan, who gave him a guide to the palace of the ſun, where he was reſtored to ſight. He then made war on Oenopion; who eſcaping his vengeance by concealing himſelf under ground, he went to Crete, where he purſued his favourite exerciſe of hunting. But having offended Diana, that goddeſs put him to death, either by her arrows, or by ſending a ſcorpion which gave him a mortal wound; but afterwards relenting, ſhe prevailed on Jupiter to raiſe him to the ſkies, where he forms a conſtellation, remarkable for predicting rain and tempeſtuous weather.

Orion, in aſtronomy, one of the conſtellations of the ſouthern hemiſphere.—The word is formed from the Greek υρειν, "to make water;" the ancients ſuppoſing that it raiſed tempeſts at its riſing and ſetting.—The ſtars in the conſtellation Orion, in Ptolemy's catalogue are 37, in Tycho's 62, in the Britannic catalogue 80.

ORISTAGNI, an ancient town of the iſland of Sardinia, with an archbiſhop's ſee. It is pretty large and well fortified; but thinly inhabited, on account of the unhealthy air: it is ſeated on the weſtern coaſt, in a bay of the ſame name, in E. Long. 8. 58. N. Lat. 39. 55.

ORIXA, a kingdom of Indoſtan, lying on the gulf of Bengal. It is divided from the ancient kingdom of Golconda, by a ridge of mountains, the end of which runs a little way into the ſea. It is fertile in corn and cattle, and they have ſeveral good towns and harbours on the coaſt; there are alſo manufactures of different kinds carried on throughout the kingdom. The prince is a Gentoo, who pays to the Great Mogul a tribute to the amount of about 12,000 l. yearly.

ORKNEY islands, certain iſlands on the north of Scotland, from which they are ſeparated by a frith 20 miles in length and 10 in breadth. They are 40 in number; but many are uninhabited, the greater part being ſmall, and producing only paſturage for cattle. The principal iſlands are denominated by the names of *Mainland, South Ronaldſha, Swinna, Flotta, Coſinſha, Strupenſha, Stronſa, Sanda,* &c. the terminations in *a*, or *ha*, being generally given in the Teutonic to ſuch places as are ſurrounded by water. The currents and tides flowing between the iſlands are extremely rapid and dangerous. Near an iſland called *Swinna* are two great whirlpools, called the *wells of Swinna*, which are counted dangerous by mariners, eſpecially in a calm. When ſailors find themſelves ſucked into the vortex, it is ſaid they throw out a barrel, or ſome bulky ſubſtance, which ſmooths the water till it is ſucked down and thrown up at a conſiderable diſtance, during which time the ſhip paſſes over in ſafety. But when there is a breeze of wind, theſe whirlpools may be croſſed without any danger.

The air of theſe iſlands is moiſt, on account of the neighbourhood of the ſea; and froſt and ſnow do not continue long. In ſome places the ſoil is bare and mountainous, and in others ſandy and barren; however, many of the iſlands produce large crops of barley and oats, but no wheat or other grain excepting what is incloſed in gardens. Theſe, when duly cultivated, produce all kinds of kitchen herbs and roots, bringing even fruit-trees to maturity; but out of them, in the open country, there is ſcarce a tree or ſhrub to be ſeen, except juniper, wild myrtle, heath, and the cyur-hodon: yet this deficiency cannot be imputed to the poverty of the ſoil, or the nature of the climate; for the trunks of large oaks are frequently dug up in the marſhes. This is likewiſe the caſe in the moſt barren parts of the Highlands of Scotland, where not a ſhrub is to be ſeen above the ſurface of the earth: nay, the inhabitants frequently find, deep in the earth, the roots of large trees, evidently exhibiting marks of the ax by which they were felled; ſo that theſe northern parts muſt have undergone ſome ſtrange revolutions. The Orkneys produce great variety of herbs and berries, graſs and corn, which laſt is exported as far as Edinburgh. In ſome of the iſlands, the natives have diſcovered mines of tin, lead, and ſilver, though none of them are wrought to any advantage; in others, we find abundance of marl, grey and red ſlate, quarries of freeſtone, and even of marble and alabaſter: when the wind rages to any violence, the ſea throws in plenty of timber, torn from other countries; and, not unfrequently, the people find large pieces of ambergreaſe. The freſh water in theſe iſlands is very pure and limpid; and, though there are no large rivers in the Orkneys, the ground is well watered with lakes and pleaſant rivulets, that not only ſerve to turn their mills, but alſo abound with trout of the moſt delicate flavour.

Beſides the abundance of little horſes, black cattle, ſheep, ſwine, and rabbits, the inhabitants of the Orkneys rear all ſorts of domeſtic animals and tame poultry. Their heaths and commons yield plenty of red deer, and all ſorts of game; partridges, growſe, heath-cocks, plover, duck, teal, and widgeon: the ſea-coaſt teems with ſeals and otters; and are viſited by whales, cod, ling, tuſk, herrings, and all manner of fiſh: on the ſhore they find ſperma ceti, os ſepiæ, and a great variety of ſhells and corallines, with a multitude of oyſters, remarkably large muſcles, crabs, and cockles. The rocks are covered with ſea-fowl, wild geeſe, ſolan geeſe, barnacles, eagles, hawks, and kites. With reſpect to the barnacles, or, as the natives call them, the *cleck geeſe*, they are ſaid to be found in ſhells ſticking by the bills to trees, in ſeveral iſlands. Martin affirms he has ſeen them in this ſituation, but could not perceive them alive; and indeed the whole account of their generation and production, exhibited by the northern naturaliſts, is abſurd and unphiloſophical. The Orkney eagles are ſo ſtrong, that, according to the reports of the country, they have been known to carry away young children in their talons. Certain it is, they make ſuch havock among the lambs, that he who kills an eagle is entitled by law to a hen from every houſe in the pariſh where it was killed. The king's falconer viſits theſe iſlands every year, in order to fetch away the young hawks and falcons from their neſts among the precipices: he enjoys a yearly ſalary of twenty pounds, and may claim a hen or a dog, from every houſe in the country, except thoſe that are expreſsly exempted from this impoſition.

The Orkneys, as well as the hills of Shetland, were originally peopled from Norway, in the ninth, tenth, or eleventh century; and the commonalty ſtill retain the language of that kingdom, diſtinguiſhed by the name of *Norns:* they likewiſe preſerve ſome cuſtoms of theſe Norwegian anceſtors. The iſlands of Orkney have been at different times ſubdued by the Scots, and recovered by the Norwegians: at length they were ſold by Magnus, king of Norway, to Alexander of Scotland, for the ſum of 4000 merks Sterling, and a yearly acknowledgement of 100 merks. Since that period, the Orkneys have continued annexed to the crown of Scotland. The gentry of the Orkneys are civilized, polite, and hoſpitable; and live like thoſe of Scotland, from whom they are chiefly deſcended. They live comfortably, are remarkably courteous to ſtrangers, and drink a great quantity of wine, with which their cellars are generally well ſtored. Indeed the inhabitants of the Orkneys may be now juſtly deemed a Scotch colony. They ſpeak the language, profeſs the religion, follow the faſhions, and are ſubject to the laws, of that people. They are frugal, ſagacious, circumſpect, religious, and hoſpitable. Their mariners are remarkably bold, active, dexterous, and hardy. Many ſurpriſing inſtances of longevity occur here, as well as in Shetland, of perſons living to the age of 140. The Orkney women are generally handſome and well-ſhaped, and bring forth children at a very advanced age. In the Orkneys, ſome particular lands are held by a tenure called *Udal Right*, from Ulcius, or Olaus, king of Norway, who farmed the lands, on condition of receiving one-third of the produce; and this right devolved in ſucceſſion, without any charter granted by the ſovereign. The inhabitants of Orkney, inſtead of meaſuring their corn, weigh it in piſmores or pundlers. Their leaſt denomination is a mark, conſiſting of 18 ounces, and 24 merks make a liſpound, which is a Daniſh quantity. The poorer ſort of people in the Orkneys appear very meanly habited, with a piece of ſeal-ſkin inſtead of ſhoes; and living chiefly on ſalt-fiſh, are ſubject to the ſcurvy. They are much addicted to ſuperſtitious rites; in particular, interpreting dreams and omens, and believing in the force of idle charms. The iſlands of Orkney, we have already obſerved, produce very bold, able, and hardy mariners. The common people, in general, are inured to fatigue, and remarkably adventurous, both in fiſhing during rough weather, and in climbing the rocks for the fleſh, eggs, and down of ſea-fowl. Formerly, while they were expoſed to the invaſions of the Norwegians, or weſtern iſlanders, every village was obliged to equip a large boat well manned; and all the fencible men appeared in arms, when the alarm was given by the beacons lighted on the tops of the rocks and higheſt mountains. Theſe beacons, known by the name of *ward-hills*, are ſtill to be ſeen in every iſland. Their corn land they incloſe with mud or ſtone walls, to preſerve it from the ravages of their ſheep, ſwine, and cattle, which wander about at random, without being attended by herdſmen: their ordinary manure, eſpecially near the ſea-coaſt, is ſea-weed, which they carefully gather and divide into equal portions. Their ſheep are marked on the ears and noſe; but ſo wild, that when they have occaſion to ſhear them in the month of May, they are obliged to hunt every individual, with dogs trained for that purpoſe. Their manner of catching ſea-fowl is curious and particular. Under the rock where theſe fowls build, they row their boat, provided with a large net, to the upper corners of which are faſtened two ropes, lowered down from the top of the mountain by men placed in that ſtation. Theſe hoiſting up the net, until it be ſpread oppoſite to the cliffs in which the fowls are ſitting, the boatmen below make a noiſe with a rattle, by which the fowls, being frightened, fly forwards into the boſom of the net, in which they are immediately encloſed and lowered down into the boat: others practiſe the method uſed in Iceland and Norway, and are lowered down by a ſingle rope from the ſummit of the mountain; this is the conſtant way of robbing the hawk's neſt. In theſe iſlands ſome ſtrange effects are produced by thunder and lightening. In the year 1680, the lightening entered a cow-houſe, in which 12 cows ſtood in a row, killed every ſecond beaſt as ſhe ſtood, and left the reſt untouched. The diſtempers that prevail moſtly in the Orkneys are agues, conſumptions, ſcurvy, and itch. The agues, which abound in the ſpring, the natives cure with a diet-drink of bitters and antiſcorbutics infuſed in ale: for phthiſical complaints they uſe the plant arby, and the caryophyllus marinus boiled with ſweet milk.

The iſles of Orkney and Shetland compoſe one ſtewartry, and ſend one member to the Britiſh parliament. The right of ſuperiority to the Orkneys was diſmembered from the crown by the union parliament, and granted for a certain yearly conſideration to the earl of Moreton, by queen Anne, who appointed him hereditary ſteward and juſticiary. This nobleman poſſeſſes the power of creating certain judges, called *bailiffs*. There is one of theſe eſtabliſhed in every iſland and pariſh, with power to ſuperintend the manners of the inhabitants, to hold courts and determine civil cauſes, according to the laws of Scotland, to the value of ten pounds Scotch money, amounting to 16 s. 8 d: but all conteſts of higher import are referred to the deciſion of the ſteward or his deputy, who reſides at Kirkwall, which is the ſeat of juſtice. Subſervient to the bailiffs are ſix or ſeven of the moſt reputable and intelligent inhabitants, who overſee the conduct of their fellows, acting as conſtables, and make report of all enormities to the bailiff; who cauſes the delinquent to be apprehended and puniſhed, if the crime be within the extent of his judicial power; otherwiſe he tranſmits him to Kirkwall, where he is tried by the ſteward. The Proteſtant religion prevails in the iſles of Orkney, according to the rites and diſcipline of the kirk, theſe, and the iſles of Shetland, conſtituting one preſbytery, which aſſembles at Kirkwall. The country is divided into 18 pariſhes, containing 31 churches, and above 100 chapels.

The trade of the Orkneys is not at preſent very conſiderable, though it might be extended to great advantage. They ſupply with freſh proviſions, for ready money, the ſhips and veſſels that touch upon the coaſt in the courſe of northern voyages, or in their paſſage from the Eaſt Indies, when they go north about Ireland and Scotland, in time of war, to avoid the privateers of the enemy. They are alſo viſited by thoſe engaged in the herring-fiſhery, though there is not ſuch a reſort on this account to theſe iſlands as to the iſles of Shetland. Nevertheleſs, a good number of boats from the weſtern parts of Scotland, as well as from Londonderry, Belfaſt, and other parts of Ireland, fiſh for herring as far north as the Leuze, and ſupply the Orkneys with tobacco, wine, brandy, and other ſpirituous liquors, cloths, and divers manufactures. Theſe they exchange for fiſh, and oil extracted from porpoiſes, ſeals, and other ſea-animals. The people of Orkney export annually great numbers of black cattle, ſwine, and ſheep; together with large quantities of corn, butter, tallow, ſalt, and ſtuffs made in the country, over and above the ſkins of ſeals, otters, lambs, and rabbits, down, feathers, writing-quills, hams, and wool: yet all theſe articles would, in point of profit, fall infinitely ſhort of their herring-fiſhery, were it proſecuted with induſtry, œconomy, and vigour. As there are no merchants in the Orkneys at preſent who export fiſh on their own account, what herrings are taken, they ſell to the Dutch or Scotch dealers in and about Inverneſs. They generally fiſh for herring on the weſt ſide of the Orkneys; and are therefore more remote from markets, than thoſe who are employed in the ſame manner on the coaſt of Shetland.

We may reckon among the curioſities of the Orkneys, the *Phaſeoli*, commonly known by the name of *Molucca beans*, which are thrown upon the ſhore after ſtorms of weſterly winds, and are ſuppoſed to be driven thus far north from the Weſt-Indies, where they grow. Many ſtrange fiſhes and curious ſhells are alſo frequently caſt up by the ocean; of theſe laſt a vaſt variety for adorning the cabinets of modern naturaliſts. Sometimes exotic fowls are driven upon the Orkneys by tempeſtuous weather: fiſh, as large as whitings, have been thrown aſhore to a conſiderable diſtance within the land. At Cantick-head, in the iſland Waes, and ſome other places, huge ſtones are often heaved up by the violence of the ſea and wind, and caſt over high rocks upon the land. A ſingle Laplander has been ſeen more than once on this coaſt, in his ſlender canoe, covered with ſkins, being driven hither by adverſe winds and ſtorms. The Orkneys are not altogether deſtitute of ancient monuments and curioſities of art. In Hoy we find an entire ſtone, 36 feet long, 18 in breadth, and 9 in thickneſs, lying between two hills, and known by the name of *dwarfie ſtone*. It is hollowed within by the tools of a maſon, the marks of which are ſtill apparent. The entrance is a ſquare hole about two feet high, with a ſtone, by way of door, ſtanding before it. Within we find a bed with a pillow cut of the ſtone; at the other end is a couch of the ſame kind; and in the middle a hearth, above which there is a hole or vent for the exit of the ſmoke. This curioſity is found in the midſt of a deſolate heath, and is ſuppoſed to have been the reſidence of a hermit: in the very neighbourhood of this ſtone there is a very high and ſteep mountain, called the *wart hill of Hoy*, near the ſummit of which, in the months of May, June, and July, ſomething at noon-day is ſeen to ſhine and ſparkle with remarkable luſtre, ſuppoſed by the common people to be an enchanted carbuncle: many peſons have clambered up the hill in queſt of it, but found nothing. Perhaps this ſplendour is produced by the reflection of the ſun on a ſmall ſtream of water ſliding over the face of a ſmooth rock. At Stennis, in the main land, there is a cauſeway of ſtones over a loch or lake, at the ſouth end of which we obſerve a circle of ſtones riſing about 20 feet above ground, each being ſix feet in breadth, and from one to two feet in thickneſs: between this circle and the cauſeway two ſtones of the ſame dimenſions ſtand by themſelves, and one of them is perforated in the middle. At the diſtance of half a mile from the other end of the cauſeway appears a larger circle of the ſame kind of ſtones, the diameter of which may amount to 110 paces; ſome of theſe ſtones are fallen; and to the eaſt and weſt of the larger circle are two artificial green mounts. Both rounds are ſurrounded with a ditch; and one cannot view them without admiration, conſidering the art that muſt have been uſed to bring ſuch unwieldy maſſes together in this order. They were probably temples and places of ſacrifice uſed in times of pagan ſuperſtition; and ſeem to bear a great affinity with the celebrated monument, called *Stonehenge*, on Saliſbury Plain in England. In one of the mounts, at the north end of the cauſeway, the natives found nine *fibulæ*, or claſps of ſilver, formed into a circle, and reſembling a horſe-ſhoe. In many different places of the Orkneys we find rude obeliſks or ſingle ſtones of a great height, ſet up either as memorials of battles, treaties, or the deceaſe of remarkable perſonages. In Rouſay, between two high mountains, there is a place which the natives diſtinguiſh by the appellation of the *camp of Jupiter Fring*: but the meaning of this name, handed down by tradition, is not known. At the weſt end of the main land, near Skeal, we find a ſurpriſing cauſeway, above a quarter of a mile in length, on the ſummit of high hills, compoſed of reddiſh ſtones of different magnitude, impreſſed with various figures both on the upper and under ſurface. Some gentlemen in the neighbourhood have carried off the moſt beautiful of theſe ſtones, to be ſet in their chimnies by way of ornament, like the painted tiles of Holland. This country produces many ſepulchres of different nations. In the plains or links of Skeal, the ſand being blown away from the ſurface of the ground, ſeveral ſquare catacombs appear built of ſtones well cemented together, containing ſome parcels of black earth, and each ſecured by a large ſtone at the mouth. Sepulchres of the ſame kind are found at Rouſum in Stronſa; which is likewiſe remarkable for a different kind of monument, conſiſting of one entire ſtone cylinder hollowed, with a bottom like that of a barrel, and a round ſtone to fill up the entrance: above, the ſtone was ſharpened into an edge; within were found ſome burned bones and red clay; and over it was placed a large flat ſtone for the preſervation of the whole. Theſe, in all probability were Roman catacombs. In Weſtra divers Daniſh graves have been diſcovered: in one of theſe appeared the ſkeleton of a man, with a ſword on one ſide, and a Daniſh ax on the other. Some have been found buried with dogs, combs, knives, and other utenſils. In many places of the country we find round hillocks or barrows, here known by the name of *brogh*, ſignifying, in the Teutonic language, burying-place, ſuppoſed to have been the cemeteries of the ancient Saxons. In different parts of theſe iſlands we ſee the remains of great buildings, believed to have been fortreſſes erected by the Danes or Norwegians when they poſſeſſed the country. One of theſe in the iſle of Wyre, called the *caſtle of Coppi-row*, ſignifying a town of ſecurity, is ſurrounded by a foſſe, and the firſt floor ſtill remains above ground, a perfect ſquare of ſtone wall, very thick, ſtrongly built, and cemented with lime, the area within not exceeding ten feet in length. Of this Coppirow the common people relate many idle fables. In the chapel of Clet, in the iſle of Sanda, there is a grave 19 feet long, in which was found part of a man's back bone, larger than that of a horſe. Human bones, of nearly the ſame ſize, have been dug up in Weſtra; and indeed this country is remarkable for producing men of a gigantic ſtature. Within the ancient fabric of Lady Kirk in South Ronalſhaw, there is a ſtone four feet long, and two feet broad, on which the print of two feet are engraven, ſuppoſed to be the place where, in times of Popery, penitents ſtood to do public pennance.

ORLE, Orlet, or *Orlo*, in architecture, a fillet under the ovolo, or quarter round of a capital. When it is at the top or bottom of a ſhaft, it is called *cincture*. Palladio uſes the word orlo for the plenith of the baſis of the columns.

Orle, in heraldry, an ordinary, in form of a fillet, drawn round the ſhield, near the edge or extremity thereof, leaving the field vacant in the middle. Its breadth is but half that of the treſſure or bordure, which contains a ſixth part of the ſhield; and the orle only a twelfth: beſides, that the orle is its own breadth diſtant from the edge of the ſhield, whereas the bordure comes the edge itſelf. The form of the orle is the ſame with that of the ſhield, whence it reſembles an eſcutcheon. See Plate CXLIV. fig. 1. (A.)

ORLEANOIS, a province of France, including the ſeveral diſtricts of Orleanois-Proper, Beauce-Proper or Chartrain, Dunois, Vendomois, Blaiſois, the greateſt part of Gatinois, and Perche-Gouet. The principal rivers of it are the Loire, the Loiret, the Cher, the Laconie, the Aigle, the Hyere, the Yonne, and the Evre. There are alſo ſome remarkable canals, particularly thoſe of Briare and Orleans. The river Loire, and the canals drawn from thence, greatly facilitate and promote the inland trade of the kingdom; and particularly of this government, which lies entirely within the juriſdiction of the parliament of Paris; and, beſides the chief governor, has ſeveral ſubordinate ones.

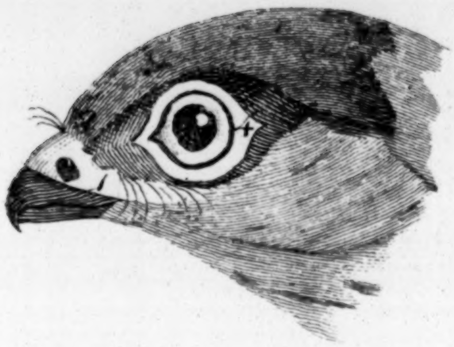
Orleanois, in Latin *Aurelianenſis Ager*, is bounded on the ſouth by Sologne, on the north by Upper-Beauce, on the eaſt by Gatinois, and on the weſt by Dunois and Vendomois. The Loire divides it into Upper and Lower; the former lying to the north, and the latter to the ſouth of that river. It yields plenty of grain, wine, wood, and fruit, and abounds in cattle, game, and fiſh. The principal places in it are,

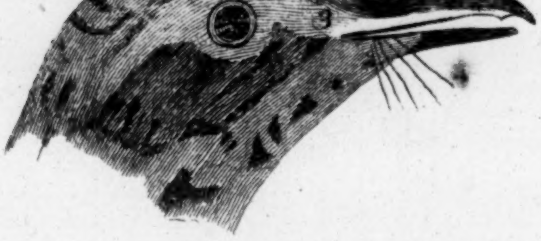
Orleans, from which it derives its name, and is the capital, not only of it, but of the whole government. It was anciently called *Genabum* or *Cenabum*, and afterwards *Aurelia*, *Aureliæ*, and *Aurelianum*; and ſtands 20 leagues from Paris to the ſouth, on the northern bank of the Loire, over which there is here a fine ſtone bridge of 16 arches, leading into a ſuburb on the ſouth ſide of the river. In Julius Cæſar's time it was the capital of the Carnutes. Aurelian, the emperor, enlarged it, and gave it his name. It is one of the largeſt cities in the king; but meanly built, and moſt of the inhabitants are poor; though there are here ſeveral inferior courts of juſtice, with an univerſity, at preſent in no great repute; a public library; a ſtately Gothic cathedral, and a great number of other churches, ſome of which are collegiate; a public walk, planted with ſeveral rows of trees; ſome ſugar-bakers; a manufacture of ſtockings and ſheep-ſkins; a ſeminary, in which divinity is taught; and a great trade in brandy, wine, ſpices, and ſeveral manufactures, which, with many other commodities, are conveyed from hence to Paris, and other places, by means of the Loire, and the canal which takes its name from the city. Some of the trading people are very rich. The canal begins about two miles above the city; is near 18 leagues in length; and terminates on the Loing, which falls into the Seine. To the north of the city is a foreſt, the largeſt in the whole kingdom, belonging to the duke of Orleans; to whom the timber felled in it brings in, one year with another, about 100,000 livres. Ever ſince the year 1344, this city has been a dukedom and peerage, and uſually an appennage of ſome prince of the blood. Lewis XIV. gave it to his brother Philip; who begun and finiſhed the canal, in whoſe family it ſtill continues. The duties paid by veſſels going up and down the canal, amount, in ſome years, to 150,000 livres. The biſhop of this city is ſuffragan to the archbiſhop of Paris, and has a revenue of 24,000 livres, out of which his tax to Rome is 2000 florins. It is ſaid, a new biſhop, on the firſt day of his entering the city, has the privilege to releaſe all the priſoners in it, except thoſe committed for treaſon. On the eighth of May, 1429, Orleans, then cloſely beſieged by the Engliſh, was relieved by Joan of Arc, commonly called the *Maid of Orleans*; and the anniverſary of that deliverance is ſtill kept here. To perpetuate the memory of it, a monument of braſs was erected on the bridge, which is ſtill in being.

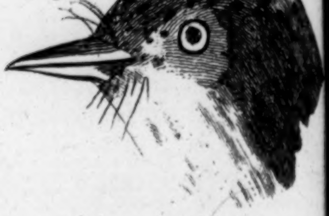
ORLOPE, in the ſea-language, the uppermoſt ſpace or deck in a great ſhip, reaching from the main to the mizen-maſt. In three-deck ſhips, the ſecond and loweſt decks are ſometimes called *orlopes*.

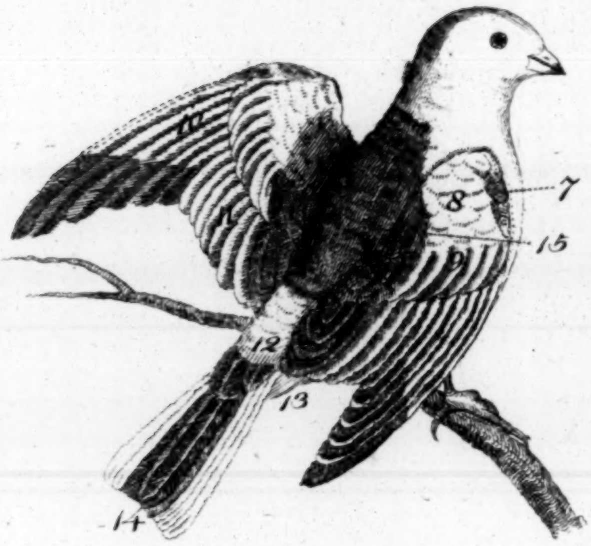
ORMOND, the northern diviſion of the county of Tipperary, in the province of Munſter in Ireland. For a long time it gave the title of *earl*, and afterwards of *marquis* and *duke*, to the noble family of Butler, deſcended from a ſiſter of Thomas à Becket archbiſhop of Canterbury; till, at the acceſſion of George I. the laſt

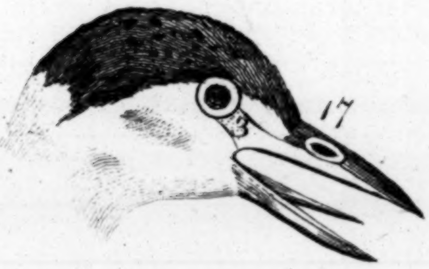
3 MA 53

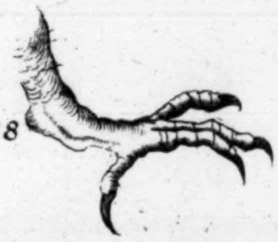

16

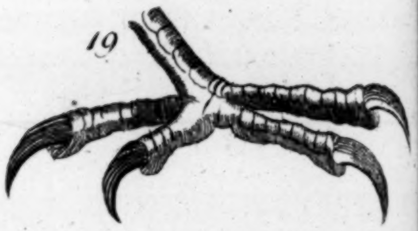

5

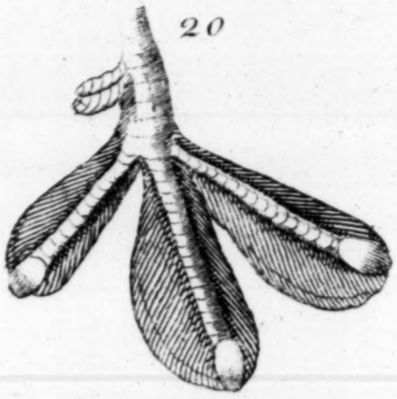

6

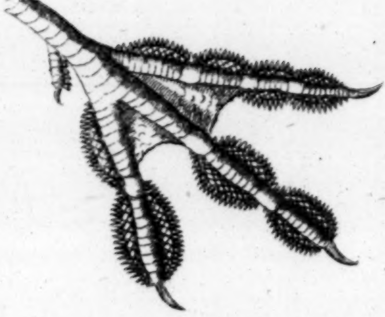

10
11
8
7
15
9
12
13
14

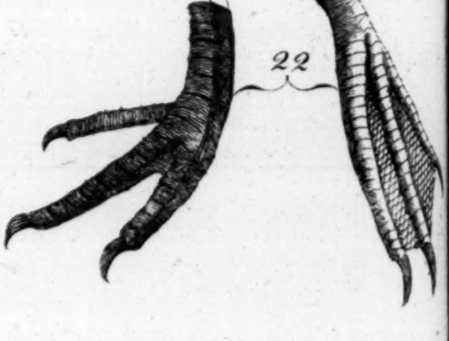

17

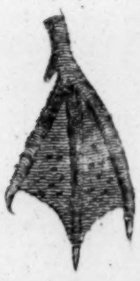

18

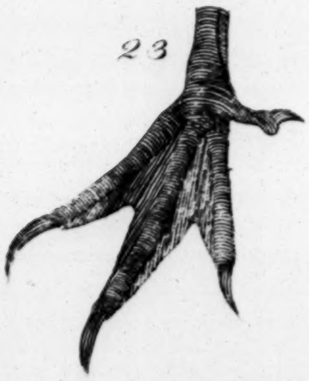

19

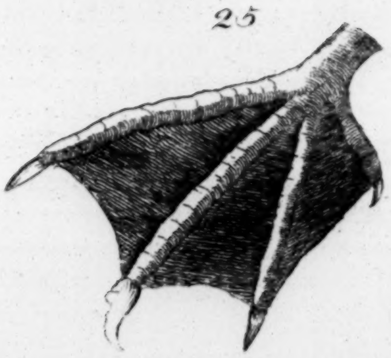

20


21


22


24


23


25

A. Bell Sculp.^t

Ormus. laſt duke was attainted of high treaſon, and died abroad. In that part of the country the family had great prerogatives and privileges granted by Edward III.

ORMUS, an iſland of Aſia, about two leagues from the main land, almoſt at the mouth of the Perſian gulph. It is about ſix leagues in circuit; but is quite barren, and has not a drop of freſh water. They catch excellent oyſters about the iſland; and it yields plenty of fine white ſalt; alſo a kind of ſhining black ſand, which is uſed for duſting writings, and is tranſported in conſiderable quantity to Europe. This iſland was for ſome time in poſſeſſion of the Portugueſe, when there was a very rich and populous town upon it, where all the trade of the Indies was managed; but that has long been in ruins, and there is now nothing inhabited but the fort.

Ornithogallum. ORNITHOGALLUM, Star of Bethlehem; a genus of the monogynia order, belonging to the hexandria claſs of plants. There are ſeven ſpecies; all of them herbaceous perennials, riſing from ſix inches to three feet high, having ſtalks terminated with long ſpikes of hexapetalous, ſtar-ſhaped, white and yellow flowers. Six of the ſpecies are very hardy, and will proſper in any ſituation; but one, named the *capenſe*, a native of the Cape of Good Hope, requires the aſſiſtance of artificial warmth to preſerve it in this country. They are all eaſily propagated by off-ſets from the roots. The bulbous roots of all the ſpecies are nutritious and wholeſome.

ORNITHOLOGY.

ORNITHOLOGY is a ſcience which treats of birds; deſcribes their form, external and internal; and teaches their œconomy and their uſes. See Bird.

A bird is an animal covered with feathers; furniſhed with a bill; having two wings, and only two legs; with the faculty, except in a very few inſtances, of removing itſelf from place to place through the air.—But before proceeding to analiſe the characteriſtic parts of birds, it will be proper to premiſe an explanation of the terms uſed by naturaliſts in deſcribing them.

EXPLANATION of ſome Technical Terms in Ornithology uſed by Pennant and Linnæus.

Fig.		
1.	*Cere. Cera*	The naked ſkin that covers the baſe of the bill in the hawk kind.
2.	*Capiſtrum*	A word uſed by Linnæus to expreſs the ſhort feathers on the forehead juſt above the bill. In crows theſe fall forwards over the noſtrils.
3.	*Lorum*	The ſpace between the bill and the eye, generally covered with feathers; but in ſome birds naked, as in the black and white grebe.
4.	*Orbits. Orbita*	The ſkin that ſurrounds the eye, which is generally bare; particularly in the heron and parrot.
5.	*Emarginatum*	A bill is called *roſtrum emarginatum* when there is a ſmall notch near the end: this is conſpicuous in that of butcher-birds and thruſhes.
6.	*Vibriſſæ*	*Vibriſſæ pectinatæ*, ſtiff hairs that grow on each ſide the mouth, formed like a double comb, to be ſeen in the goatſucker, flycatcher, &c.
7.	*Baſtard wing* *Alula ſpuria*	A ſmall joint riſing at the end of the middle part of the wing, or the *cubitus*; on which are three or five feathers.
8.	*Leſſer coverts of the wings* *Tectrices primæ*	The ſmall feathers that lie in ſeveral rows on the bones of the wings. The under coverts are thoſe that line the inſide of the wings.
9.	*Greater coverts* *Tectrices ſecundæ*	The feathers that lie immediately over the quill-feathers and ſecondary feathers.
10.	*Quill-feathers* *Primores*	The largeſt feathers of the wings, or thoſe that riſe from the firſt bone.
11.	*Secondary feathers* *Secondariæ*	Thoſe that riſe from the ſecond.
12.	*Coverts of the tail* *Uropygium*	Thoſe that cover the baſe of the tail.
13.	*Vent-feathers*	Thoſe that lie from the vent to the tail. *Criſſum Linnæi.*
14.	*The tail. Rectrices*	
15.	*Scapular feathers*	That riſe from the ſhoulders, and cover the ſides of the back.
16.	*Nucha*	The hind part of the head.
17.	*Roſtrum ſubulatum*	A term Linnæus uſes for a ſtraight and ſlender bill.
18.		To ſhew the ſtructure of the feet of the kingfiſher.
19.	*Pes ſcanſorius*	The foot of the woodpecker formed for climbing. Climbing feet.
20.	*Finned foot. Pes lobatus, pinnatus*	Such as thoſe of the grebes, &c. Such as are indented, as fig. 21. are called *ſcalloped*, ſuch are thoſe of coots and ſcallop-toed ſandpipers.
22.	*Pes tridactylus*	Such as want the back toe.
23.	*Semi-palmated. Pes ſemi-palmatus*	When the webs only reach half way of the toes.
24.	*Ungue poſtico ſeſſili*	When the hind-claw adheres to the leg without any toe, as in the petrels.
25.	*Digitis 4 omnibus palmatis*	All the four toes connected by webs, as in the corvorants.
	Roſtrum cultratum	When the edges of the bill are very ſharp, ſuch as in that of the crow.

Unguiculatum	A bill with a nail at the end, as in thoſe of the gooſanders and ducks.
Lingua ciliata	When the tongue is edged with fine briſtles, as in ducks.
Integra	When plain or even.
Lumbriciformis	When the tongue is long, round, and ſlender like a worm, as that of the woodpecker.
Pedes compedes	When the legs are placed ſo far behind as to make the bird walk with difficulty, or as if in fetters; as is the caſe with the auks, grebes, and divers.
Nares Lineares	When the noſtrils are very narrow; as in ſea gulls.
Marginatæ	With a rim round the noſtrils, as in the ſtare.

SECT. I. *External parts of Birds.*

A BIRD may be divided into *head*, *body*, and *limbs*.

I. HEAD.

1. BILL *(roſtrum)*, is a hard horny ſubſtance, conſiſting of an upper and under part, extending from the head, and anſwering to the mandibles in quadrupeds. Its edges generally plain and ſharp, like the edge of a knife, *cultrated*, as are the bills of crows; but ſometimes *ſerrated*, as in the toucan; or *jagged*, as in the gannet and ſome herons; or *pectinated*, as in the duck; or *denticulated*, as in the merganſers; but always deſtitute of real teeth immerſed in ſockets.

The baſe in falcons is covered with a naked ſkin or cere (*cera*); in ſome birds with a carneous appendage, as the turkey; or a callous, as the curaſſo.

In birds of prey, the bill is hooked at the end, and fit for tearing: in crows, ſtraight and ſtrong for picking: In water-fowl, either long and pointed, for ſtriking; or ſlender and blunt, for ſearching in the mire; or flat and broad, for gobbling. Its other uſes are for building neſts; feeding the young; climbing, as in parrots; or, laſtly, as an inſtrument of defence, or offence.

2. NOSTRILS, *(nares)*, the nice inſtruments of diſcerning their food, are placed either in the middle of the upper mandible, or near the baſe, or at the baſe, as in parrots; or behind the baſe, as in toucans and hornbills: but ſome birds, as the gannet, are deſtitute of noſtrils. The noſtrils are generally naked; but ſometimes covered with briſtles reflected over them, as in crows, or hid in the feathers, as in parrots, &c.

The fore-part of the head is called the *front* (*capiſtrum*); the ſummit (*vertex*), or the *crown:* the hind part, with the next joint of the neck (*nucha*), the *nape:* the ſpace between the bill and the eyes, which in herons, grebes, &c. is naked, (*lora*), the *ſtraps:* the ſpace beneath the eyes (*genæ*), the *cheeks*.

3. ORBITS, (*orbitæ*), the eye-lids; in ſome birds naked, in others covered with ſhort ſoft feathers.

Birds have no eye-brows; but the grous kind have in lieu, a ſcarlet naked ſkin above, which are called *ſupercilia;* the ſame word is alſo applied to any line of a different colour that paſſes from the bill over the eyes.

4. EARS. Birds are deſtitute of auricles or external ears, having an orifice for admiſſion of ſound; open in all but owls, whoſe ears are furniſhed with valves.

5. The CHIN, the ſpace between the parts of the lower mandible and the neck, is generally covered with feathers; but, in the cock and ſome others, have carneous appendages called *wattles* (*palearia*); in others, is naked, and furniſhed with a pouch, capable of great dilatation *(ſacculus)*, as in the pelican and corvorants.

6. NECK, (*collum*), the part that connects the head to the body, is longer in birds than any other animals; and longer in ſuch as have long legs than thoſe that have ſhort, either for gathering up their meat from the ground, or ſtriking their prey in the water, except in web-footed fowl, which are, by reverſing their bodies, deſtined to ſearch for food at the bottom of waters, as ſwans, and the like. Birds, eſpecially thoſe that have a long neck, have the power of retracting, bending, or ſtretching it out, in order to change their centre of gravity from their legs to their wings.

II. BODY.

1. Conſiſts of the BACK, (*dorſum*); which is flat, ſtraight, and inclines; terminated by the

2. RUMP, (*uropygium*), furniſhed with two glands, ſecreting a fattiſh liquor from an orifice each has, which the birds expreſs with their bills to oil or anoint the diſcompoſed parts of their feathers. Theſe glands are particularly large in moſt web-footed water-fowl; but in the grebes, which want tails, they are ſmaller.

2. BREAST, (*pectus*), is ridged and very muſcular, defended by a forked bone, (*clavicula*), the merry-thought.

The ſhort-winged birds, ſuch as grous, &c. have their breaſts moſt fleſhy or muſcular; as they require greater powers in flying than the long-winged birds, ſuch as gulls, herons, which are ſpecifically lighter, and have greater extent of ſail.

4. BELLY, (*abdomen*), is covered with a ſtrong ſkin, and contains the entrails.

5. The VENT, or vent-feathers, (*criſſum*), which lies between the thighs and the tail. The anus lies hid in thoſe feathers.

III. LIMBS.

1. WINGS, (*alæ*), adapted for flight in all birds except the dodo, oſtriches, great auk, and the pinguins, whoſe wings are too ſhort for the uſe of flying; but in the dodo and oſtrich, when extended, ſerve to accelerate their motion in running; and in the pinguins perform the office of fins, in ſwimming or diving.

The wings have near their end an appendage covered with four or five feathers called the *baſtard wing*, (*ala notha*), and *alula ſpuria*.

The leſſer coverts (*tectrices*), are the feathers which lie on the bones of the wings.

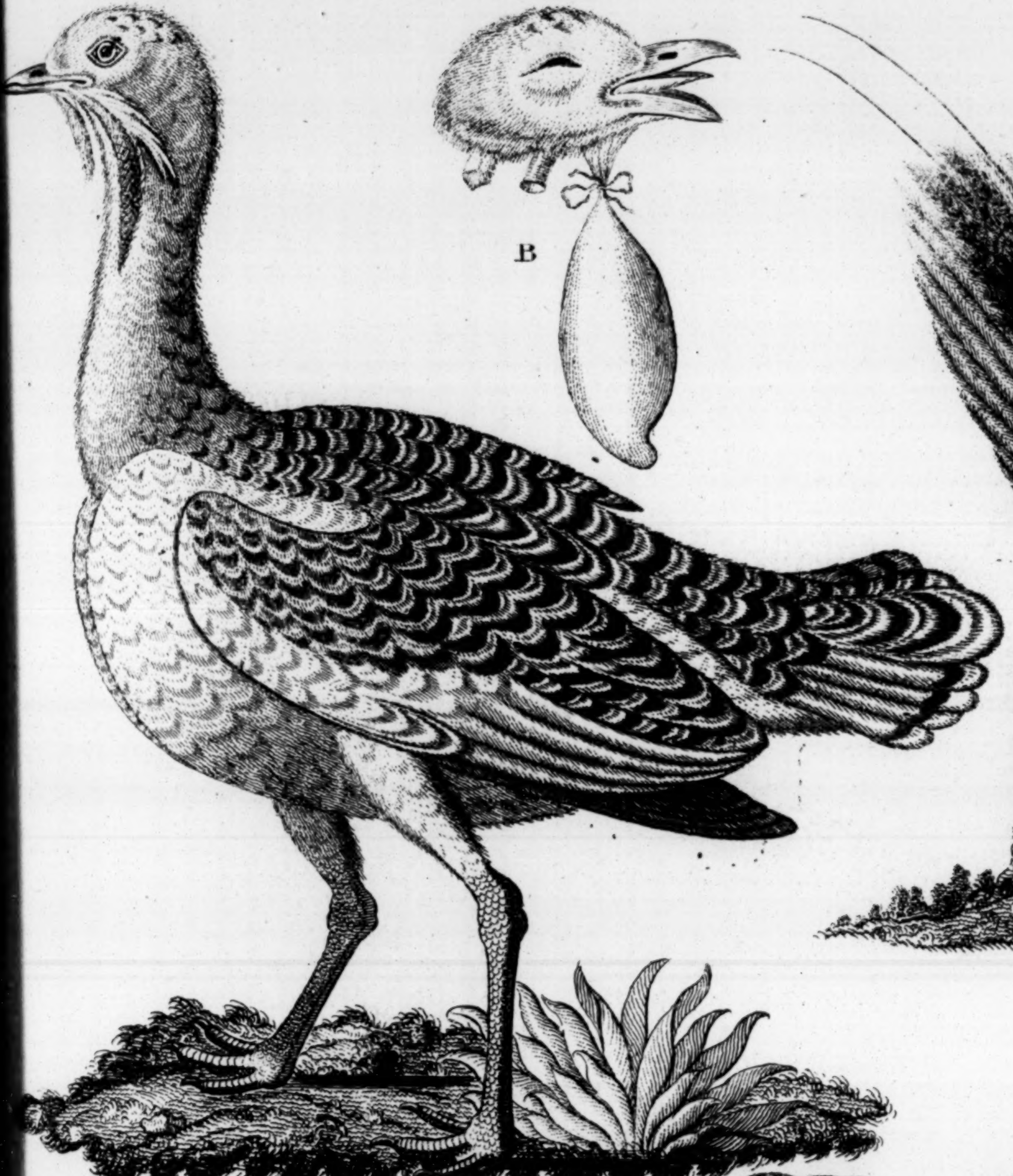
The greater coverts are thoſe which lie beneath the former, and cover the quill-feathers and the ſecondaries.

The quill-feathers (*primores*), ſpring from the firſt bones (*digiti* and *metacarpi*) of the wings, and are 10 in number.

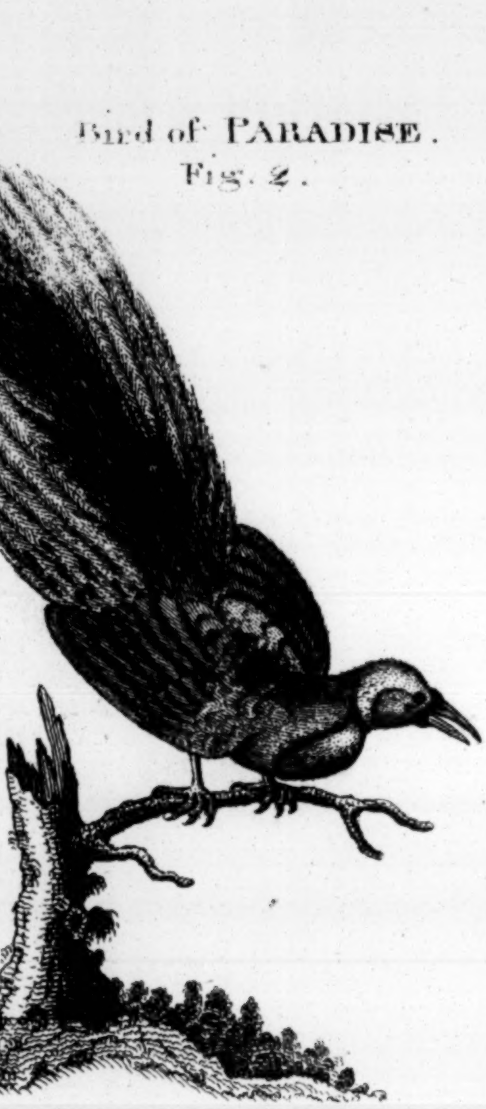
Quill-feathers are broader on their inner than exterior ſides.

The ſecondaries (*ſecondariæ*), are thoſe that riſe from the ſecond part (*cubitus*), and are about 18 in number,

Fig. 1. OTIS Tarda.



Bird of PARADISE.
Fig. 2.



PARHELION.
Fig. 4.

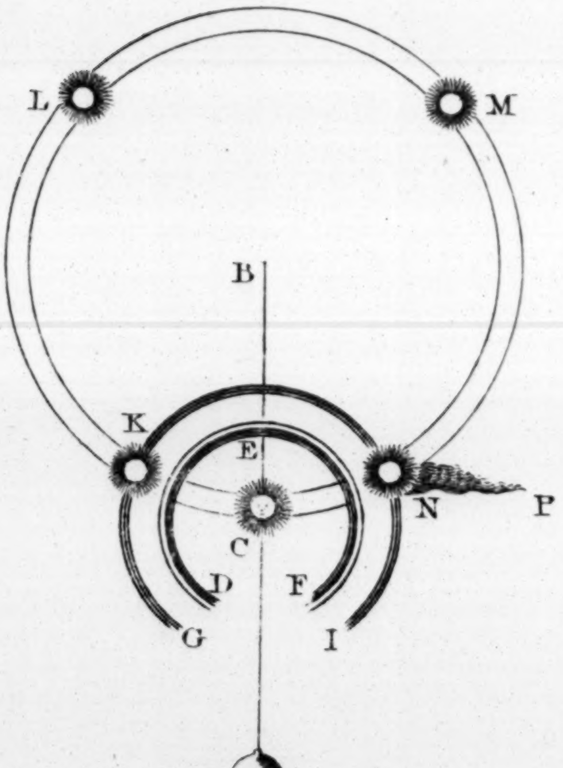
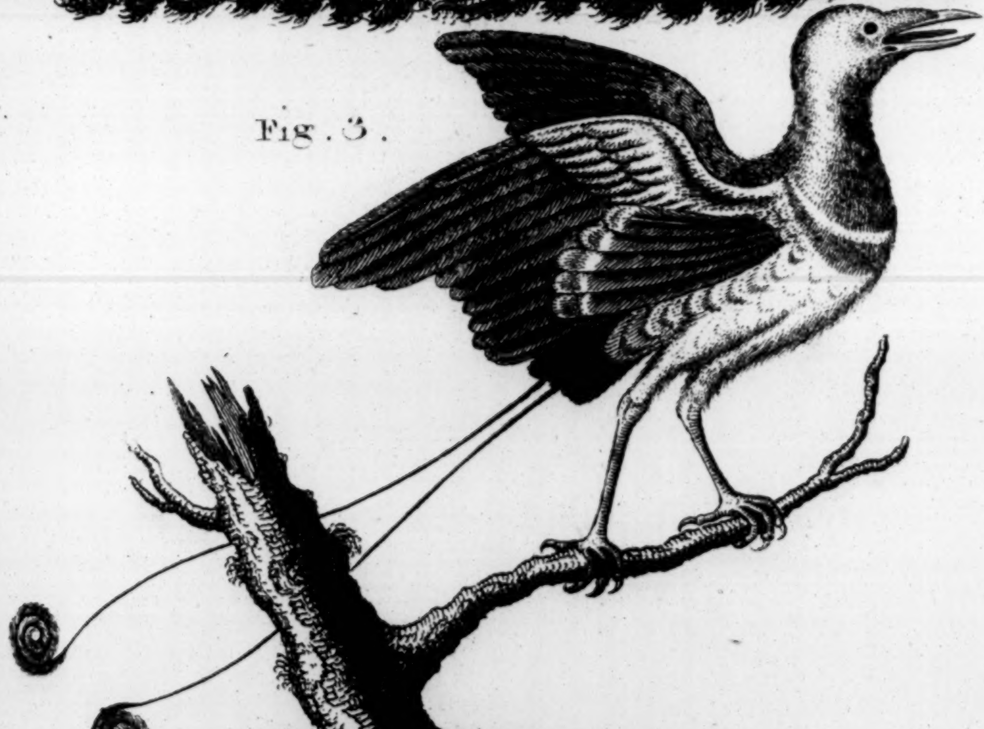

L
M
B
K
E
N
P
C
D
F
G
I
A

Fig. 3.



A. Bell Sculp^t.

3 MA 53

number, are equally broad on both ſides. The primary and ſecondary wing-feathers are called *remiges*.

A tuft of feathers placed beyond the ſecondaries near the junction of the wings with the body. This, in water-fowl, is generally longer than the ſecondaries, and cuneiform.

The ſcapulars are a tuft of long feathers ariſing near the junction of the wings (*brachia*) with the body, and lie along the ſides of the back, but may be eaſily diſtinguiſhed, and raiſed with one's finger.

The inner coverts are thoſe that clothe the under ſide of the wing.

The ſubaxillary are peculiar to the greater Paradiſe.

The wings of ſome birds are inſtruments of offence. The anhima of Marcgrave has two ſtrong ſpines in the front of each wing. A ſpecies of plover, Edw. *tab.* 47. and 280. has a ſingle one on each; the whole tribe of jacana, and the gambo, or ſpur-winged gooſe of Mr Willoughby, the ſame.

2. The Tail is the director, or rudder, of birds in their flight; they riſe, ſink, or turn by its means; for, when the head points one way, the tail inclines to the other ſide: it is, beſides, an equilibrium or counterpoiſe to the other parts; the uſe is very evident in the kite and ſwallows.

The tail conſiſts of ſtrong feathers (*rectrices*), 10 in number, as in the woodpeckers, &c.; 12 in the hawk tribe, and many others; in the gallinaceous, the merganſers, and the duck kind, of more.

It is either even at the end, as in moſt birds; or forked, as in ſwallows; or cuneated, as in magpies, &c.; or rounded, as in the purple jackdaw of Cateſby. The grebe is deſtitute of a tail, the rump being covered with down; and that of the caſſowary with the feathers of the back.

Immediately over the tail, are certain feathers that ſpring from the lower part of the back, and are called the *coverts of the tail*, (*uropygium*).

3. Thighs, (*femora*), are covered entirely with feathers in all land-birds, except the buſtards and the oſtriches; the lower part of thoſe of all waders, or cloven-footed water-fowl, are naked; that of all web-footed fowl the ſame, but in a leſs degree; in rapacious birds, are very muſcular.

4. Legs, (*crura*); thoſe of rapacious fowls very ſtrong, furniſhed with large tendons, and fitted for tearing and a firm gripe. The legs of ſome of this genus are covered with feathers down to the toes, ſuch as the golden eagle; others to the very nails; but thoſe of moſt other birds are covered with ſcales, or with a ſkin divided into ſegments, or continuous. In ſome of the pies, and in all the paſſerine tribe, the ſkin is thin and membranous; in thoſe of web-footed water-fowl, ſtrong.

The legs of moſt birds are placed near the centre of gravity: in land-birds, or in waders that want the back toe, exactly ſo; for they want that appendage to keep them erect. Auks, grebes, divers, and pinguins, have their legs placed quite behind, ſo are neceſſitated to ſit erect: their pace is aukward and difficult, walking like men in fetters: hence Linnæus ſtyles their feet *pedes compedes*.

The legs of all cloven-footed water-fowl are long, as they muſt wade in ſearch of food: of the palmated, ſhort, except thoſe of the flamingo, the avoſet, and the courier.

5. Feet, (*pedes*), in all land-birds that perch, have a large back toe: moſt of them have three toes forward, and one backward. Woodpeckers, parrots, and other birds that climb much, have two forward, two backward; but parrots have the power of bringing one of their hind toes forward while they are feeding themſelves. Owls have alſo the power of turning one of their fore toes backward. All the toes of the *ſwift* turn forwards, which is peculiar among land-birds: the tridactylous woodpecker is alſo anomalous, having only two toes forward, one backward: the oſtrich is another, having but two toes.

6. Toes, (*digiti*). The toes of all waders are divided; but, between the exterior and middle toe, is generally a ſmall web, reaching as far as the firſt joint.

The toes of birds that ſwim are either plain, as in the ſingle inſtance of the common water-hen or gallinule; or pinnated, as in the coots and grebes; or entirely webbed or palmated, as in all other ſwimmers.

All the plover tribe, or charadrii, want the back-toe. In the ſwimmers, the ſame want prevails among the albatroſſes and auks. No water-fowl perch, except certain herons, the corvorant, and the ſhag.

7. Claws, (*ungues*). Rapacious birds have very ſtrong, hooked, and ſharp claws, vultures excepted. Thoſe of all land-birds that rooſt on trees have alſo hooked claws, to enable them to perch in ſafety while aſleep.

The gallinaceous tribe have broad concave claws for ſcraping up the ground.

Grebes have flat nails like the human.

Among water-fowl, only the ſkua, *Br. Zool.* II. p. 417. 3d edit. n° 234, and the black-toed gull, *Br. Zool.* II. p. 419, 3d edit. n° 435, have ſtrong hooked or aquiline claws. All land-birds perch on trees, except the ſtruthious and ſome of the gallinaceous tribes. Parrots climb; woodpeckers creep up the bodies and boughs of trees; ſwallows cling.

All water-fowl reſt on the ground, except certain herons, and one ſpecies of ibis, the ſpoonbill, one or two ſpecies of ducks and of corvorants.

IV. FEATHERS.

Feathers are deſigned for two uſes; as coverings from the inclemency of the weather, and inſtruments of motion through the air. They are placed in ſuch a manner as to fall over one another, (*tegulatim*), ſo as to permit the wet to run off, and to exclude the cold; and thoſe on the body are placed in a quincuncial form; moſt apparent in the thick-ſkinned water-fowl, particularly in the divers.

1. The parts of a feather are, the ſhafts; corneous, ſtrong, light, rounded, and hollow at the lower part; at the upper, convex above, concave beneath, and chiefly compoſed of a pith.

2. On each ſide the ſhafts are the vanes, broad on one ſide, narrow on the other; each vane conſiſts of a multitude of thin laminæ, ſtiff, and of the nature of a ſplit quill. Theſe laminæ are cloſely braced together by the elegant contrivance of a multitude of ſmall briſtles; thoſe on one ſide hooked, the other ſtraight, which lock into each other, and keep the vanes ſmooth, compact, and ſtrong.

The vanes near the bottom of the ſhafts are ſoft, unconnected, Flight.

connected, and downy.

3. Feathers are of three kinds. (1.) Such as compoſe inſtruments of flight: as the pen-feathers, or thoſe which form the wings and tail, and have a large ſhaft. The vanes of the exterior ſide bending downward, of the interior upwards, lying cloſe on each other, ſo that, when ſpread, not a feather miſſes its impulſe on the air. The component parts of theſe feathers are deſcribed before.

(2.) The feathers that cover the body, which may be properly called the *plumage*, have little ſhaft, and much vane; and never are exerted or relaxed, unleſs in anger, fright, or illneſs.

(3.) The Down, (*plumæ*), which is diſperſed over the whole body amidſt the plumage, is ſhort, ſoft, unconnected, conſiſts of lanuginous vanes, and is intended for excluding that air or water which may penetrate or eſcape through the former. This is particularly apparent in aquatic birds, and remarkably ſo in the anſerine tribe. There are exceptions to the forms of feathers. The vanes of the ſubaxillary feathers of the Paradiſe are unconnected, and the laminæ diſtant, looking like herring-bone. Thoſe of the tail of the oſtrich, and head of a ſpecies of curaſſo, curled. Thoſe of the caſſowary conſiſt of two ſhafts, ariſing from a common ſtem at the bottom: as do, at the approach of winter, (after moulting), thoſe of the ptarmigans of arctic countries. The feathers of the pinguins, particularly thoſe of the wings, conſiſt chiefly of thin flat ſhafts, and more reſemble ſcales than feathers; thoſe of the tail, like ſplit whale-bone.

SECT. II. *Flight of Birds.*

The flight of birds is various; for, had all the ſame, none could elude that of rapacious birds. Thoſe which are much on wing, or flit from place to place, often owe their preſervation to that cauſe: thoſe in the water, to diving.

Kites, and many of the falcon tribe, glide ſmoothly through the air, with ſcarce any apparent motion of the wings.

Moſt of the order of pies fly quick, with a frequent repetition of the motion of the wings. The Paradiſe floats on the air. Woodpeckers fly aukwardly, and by jerks, and have a propenſity to ſink in their progreſs.

The gallinaceous tribe, in general, fly very ſtrong and ſwiftly; but their courſe is ſeldom long, by reaſon of the weight of their bodies.

The columbine race is of ſingular ſwiftneſs; witneſs the flight of the Carrier-*Pigeon*.

The paſſerine fly with a quick repetition of ſtrokes; their flight, except in migration, is ſeldom diſtant.

Among them, the ſwallow tribe is remarkably agile, their evolutions ſudden, and their continuance on wing long.

Nature hath denied flight to the ſtruthious; but ſtill, in running, their ſhort wings are of uſe, when erect, to collect the wind, and like ſails to accelerate their motion.

Many of the greater cloven-footed water-fowl, or waders, have a ſlow and flagging flight; but moſt of the leſſer fly ſwiftly, and moſt of them with extended legs, to compenſate the ſhortneſs of their tails. Rails and gallinules, fly with their legs hanging down.

Coots and grebes, with difficulty are forced from the water; but when they riſe, fly ſwifty. Grebes, and alſo divers, fly with their hind parts downwards, by reaſon of the forwardneſs of their wings.

Web-footed fowl are various in their flight. Several have a ſailing or flagging wing, ſuch as gulls. Pinguins, and a ſingle auk, are denied the power of flight. Wild geeſe, in their migrations, do not fly pell-mell, but in a regular figure, in order to cut the air with greater eaſe; for example, in long lines, in the figure of a >, or ſome pointed form or letter, as the ancients report that the cranes aſſumed in their annual migrations, till their order was broken by ſtorms.

> Strymona *ſic gelidum, bruma pellente, relinquunt,*
> *Poturæ te,* Nile, Grues, *primoque volatu*
> *Effingunt varias, caſu monſtrante, figuras.*
> *Mox ubi percuſſit tenſas* Notus *altior alas,*
> *Confuſos temere immiſtæ glomerantur in orbes,*
> *Et turbata perit diſperſis* litera * *pennis.*
>
> Lucan. *lib.* v. *l.* 711.

SECT. III. *Of the Nuptials, Nidification, and Eggs of Birds.*

Nuptial

1. Most birds are monogamous, or pair; in ſpring fixing on a mate, and keeping conſtant till the cares of incubation and educating the young brood is paſt. This is the caſe, as far as we know, with all the birds of the firſt, ſecond, fourth, and fifth orders.

Birds that loſe their mates early, aſſociate with others; and birds that loſe their firſt eggs will pair and lay again. The male, as well as the female, of ſeveral, join alternately in the trouble of incubation, and always in that of nutrition; when the young are hatched, both are buſied in looking out for and bringing food to the neſtlings; and, at that period the mates of the melodious tribes, who, before, were perched on ſome ſprig, and by their warbling alleviated the care of the females confined to the neſt, now join in the common duty.

Of the gallinaceous tribe, the greateſt part are polygamous, at leaſt in a tame ſtate; the pheaſant, many of the grous, the partridges, and buſtards, are monogamous; of the grous, the cock of the wood, and the black game, aſſemble the females during the ſeaſon of love, by their cries,

> *Et venerem incertam rapiunt.*

The males of polygamous birds neglect their young; and, in ſome caſes, would deſtroy them, if they met with them. The œconomy of the ſtruthious order, in this reſpect, is obſcure. It is probable that the three ſpecies in the genus oſtrich are polygamous, like the common poultry, for they lay many eggs; the dodo is ſaid to lay but one.

All waders or cloven-footed fowl are monogamous; and all with pinnated feet, are alſo monogamous, except the ruffs.

The ſwimmers or web-footed fowl obſerve the ſame order, as far as can be remarked with any certainty; but many of the auks aſſemble in the rocks in ſuch numbers, and each individual ſo contiguous, that it is not poſſible to determine their method in this article.

It may be remarked, that the affection of birds to their young is very violent during the whole time of nutrition, or as long as they continue in a helpleſs ſtate; but, ſo ſoon as the brood can fly and ſhift for itſelf, the parents neglect, and even drive it from their haunts, the affection ceaſing with the neceſſity of it: but, during that period,

---

* Tau.

> The mothers nurſe it, and the ſires defend.
> The young diſmiſs'd, to wander earth, or air,
> There ſtops the inſtinct, and there ends the care:
> The link diſſolves; each ſeeks a freſh embrace;
> Another love ſucceeds, another race.

2. The Nest of a bird is one of thoſe daily miracles that from its familiarity is paſſed over without regard. We ſtare with wonder at things that rarely happen, and neglect the daily operations of nature that ought firſt to excite our admiration and claim our attention.

Each bird, after nuptials, prepares a place ſuited to its ſpecies, for the depoſiting its eggs and ſheltering its little brood: different genera, and different ſpecies, ſet about the taſk in a manner ſuitable to their ſeveral natures; yet, every individual of the ſame ſpecies collects the very ſame materials, puts them together in the ſame form, and chooſes the ſame ſort of ſituation for placing this temporary habitation. The young bird of the laſt year, which never ſaw the building of a neſt, directed by a heaven-taught ſagacity, purſues the ſame plan in the ſtructure of it, and ſelects the ſame materials as its parent did before. Birds of the ſame ſpecies, of different and remote countries, do the ſame. The ſwallows of Britain, and of the remoter parts of Germany, obſerve the ſame order of architecture.

The neſts of the larger rapacious birds are rude, made of ſticks and bents, but often lined with ſomething ſoft; they generally build in high rocks, ruined towers, and in deſolate places: enemies to the whole feathered creation, they ſeem conſcious of attacks, and ſeek ſolitude. A few build upon the ground.

Shrikes, the leaſt of rapacious birds, build their neſts in buſhes, with moſs, wool, &c.

The order of pies is very irregular in the ſtructure of their neſts. Parrots, and in fact all birds with two toes forward and two backward, lay their eggs in the hollows of trees. And moſt of this order creep along the bodies of trees, and lodge their eggs alſo within them.

Crows build in trees: among them, the neſt of the magpie, compoſed of rude materials, is made with much art, quite covered with thorns, and only a hole left for admittance.

The neſts of the orioles are contrived with wonderful ſagacity, and are hung at the end of ſome bough, or between the forks of extreme branches. In Europe, only three birds have penſile neſts; the common oriola, the parus pendulinus, or hang-neſt titmouſe, and one more. But in the torrid zones, where the birds fear the ſearch of the gliding ſerpent and inquiſitive monkey, the inſtances are very frequent; a marvellous inſtinct implanted in them for the preſervation of their young.

All of the gallinaceous and ſtruthius orders lay their eggs on the ground. The oſtrich is the only exception, among birds, of the want of natural affection: "Which leaveth her eggs in the earth, and warmeth them in the duſt, and forgetteth that the foot may cruſh them, or the wild beaſt may break them."

The columbine race makes a moſt artleſs neſt, a few ſticks laid acroſs may ſuffice.

Moſt of the paſſerine order build their neſts in ſhrubs or buſhes, and ſome in holes of walls or banks. Several in the Torrid Zone are penſile from the boughs of high trees; that of the taylor-bird, a wondrous inſtance †. Some of this order, ſuch as larks, and the goatſucker, on the ground. Some ſwallows make a curious plaſter-neſt beneath the roofs of houſes; and an Indian ſpecies, one of a certain glutinous matter, which are collected as delicate ingredients for ſoups of Chineſe epicures. See the article Birds-*Neſts*.

Moſt of the cloven-footed water-fowl, or waders, lay upon the ground. Spoonbills and the common heron build in trees, and make up large neſts with ſticks, &c. Storks build on churches, or the tops of houſes.

Coots make a great neſt near the water-ſide.

Grebes, in the water, a floating neſt, perhaps adhering to ſome neighbouring reeds.

Web-footed fowl breed on the ground, as the avoſet, terns, ſome of the gulls, merganſers, and ducks: the laſt pull the down from their breaſts, to make a ſofter and warmer bed for their young. Auks and guillemots lay their eggs on the naked ſhelves of high rocks; pinguins, in holes under ground: among the pelicans, that which gives name to the genus, makes its neſt in the deſart, on the ground. Shags, ſometimes on trees; corvorants and gannets, on high rocks, with ſticks, dried algæ, and other courſe materials.

Eggs.

3. Rapacious birds, in general, lay few Eggs; eagles, and the larger kinds, fewer than the leſſer. The eggs of falcons and owls are rounder than thoſe of moſt other birds; they lay more than ſix.

The order of pies vary greatly in the number of their eggs.

Parrots lay only two or three white eggs.

Crows lay ſix eggs, greeniſh, mottled with duſky.

Cuckoos, as far as we can learn, two.

Woodpeckers, wryneck, and kingsfiſher, lay eggs of a clear white and ſemi-tranſparent colour. The woodpeckers lay ſix, the others more.

The nuthatch lays often in the year, eight at a time, white, ſpotted with brown.

The hoopoe lays but two cinerous eggs.

The creeper lays a great number of eggs.

The honeyſucker, the leaſt and moſt defenceleſs of birds, lays but two: but Providence wiſely prevents the extinction of the genus, by a ſwiftneſs of flight that eludes every purſuit.

The gallinaceous order, the moſt uſeful of any to mankind, lay the moſt eggs, from 8 to 20. *Benigna circa hoc natura, innocua et eſculenta animalia fœcunda generavit*, is a fine obſervation of Pliny. With exception to the buſtard, a bird that hangs between the gallinaceous and the waders, which lays only two.

The columbine order lays but two white eggs; but the domeſtic kind, breeding almoſt every month, ſupports the remark of the Roman naturaliſt.

All of the paſſerine order lay from four to ſix eggs; except the titmice and the wren, which lay 15 or 18, and the goatſucker, which lays only two.

The ſtruthious order, which conſiſts but of two genera, diſagree much in the number of eggs: the oſtrich laying many, as far as 50; the dodo, but one.

† See Motacilla nº 5.

Syſtem.

The cloven-footed water-fowl, or waders, lay, in general, four eggs: The crane and the Norfolk plover, ſeldom more than two. All thoſe of the ſnipe and plover genus are of a dirty white, or olive ſpotted with black, and ſcarce to be diſtinguiſhed in the holes they lay in. The bird called the Land Rail, (an ambiguous ſpecies,) lays from 15 to 20. Of birds with pinnated feet, the coot lays ſeven or eight eggs, and ſometimes more. Grebes, from four to eight, and thoſe white.

The web-footed, or ſwimmers, differ in the number of their eggs. Thoſe which border on the order of waders, lay few eggs; the avoſet, two; the flamingo, three; the albatroſs, the auks, and guillemots, lay only one egg a-piece: the eggs of the two laſt are of a ſize ſtrangely large in proportion to the bulk of the birds. They are commonly of a pale green colour, ſpotted, and ſtriped ſo variouſly, that not two are alike; which gives every individual the means of diſtinguiſhing its own on the naked rock, where ſuch multitudes aſſemble.

Divers, only two.

Terns and gulls lay about three eggs, of a dirty olive, ſpotted with black.

Ducks lay from eight to twenty eggs; the eggs of all the genus are of a pale green, or white, and unſpotted.

Pinguins probably lay but one egg.

Of the pelican genus, the gannet lays but one egg; the ſhags or corvorants, ſix or ſeven, all white; the laſt, the moſt oblong of eggs.

A minute account of the eggs of birds might occupy a treatiſe of itſelf. This is only meant to ſhew the great conformity natures obſerves in the ſhape and colours of the eggs of congenerous birds; and alſo, that ſhe keeps the ſame uniformity of colour in the eggs, as in the plumage of the birds they belong to.

Zinanni publiſhed, at Venice, in 1737, a treatiſe on eggs, illuſtrated with accurate figures of 106 eggs. Mr Reyger of Dantzick publiſhed in 1766, a poſthumous work by Klein, with 21 plates, elegantly coloured: but much remains for future writers.

SECT. IV. *Syſtem.*

CONSIDERING the many ſyſtems that have been offered to the public of late years, Mr Pennant gives the preference to that compoſed by Mr Ray in 1667, and afterwards publiſhed in 1678; but obſerves, at the ſame time, that it would be unfair to conceal the writer, from whom our great countryman took the original hint of forming that ſyſtem which has proved the foundation of all that has been compoſed ſince that period.

It was a Frenchman, Belon of Mans, who firſt attempted to range birds according to their natures; and performed great matters, conſidering the unenlightened age he lived in; for his book was publiſhed in 1555. His arrangment of rapacious birds is as judicious as that of the lateſt writers. For his ſecond chapter treats of vultures, falcons, ſhrikes, and owls: in the two next, he paſſes over to the web-footed water-fowl, and to the cloven-footed: in the fifth, he includes the gallinaceous and ſtruthious; but mixes with them the plovers, buntings, and larks: in the ſixth are the pies, pigeons, and thruſhes; and the ſeventh takes in the reſt of the paſſerine order.

Syſtem.

Notwithſtaning the great defects that every naturaliſt will at once ſee in the arrangement of the leſſer birds of this writer, yet he will obſerve a rectitude of intention in general, and a fine notion of ſyſtem, which was left to the following age to mature and bring to perfection. Accordingly, Mr Ray, and his illuſtrious pupil the Hon. Francis Willughby, aſſumed the plan; but, with great judgment, flung into their proper ſtations and proper genera thoſe which Belon had confuſedly mixed together. They formed the great diviſion of terreſtrial and aquatic birds; they made every ſpecies occupy their proper place, conſulting at once exterior form and natural habit. They could not bear the affected intervention of aquatic birds in the midſt of terreſtrial birds. They placed the laſt by themſelves; clear and diſtinct from thoſe whoſe haunts and œconomy were ſo different.

The ſubjoined ſcheme of arrangement by Mr Pennant, is introduced with the following obſervations.

Pennant
Genera
Birds.

"Mr Ray's general plan is ſo judicious, that to me it ſeems ſcarce poſſible to make any change in it for the better: yet, notwithſtanding he was in a manner the founder of ſyſtematic Zoology, later diſcoveries have made a few improvements on his labours. My candid friend Linnæus will not take it amiſs, that I, in part, neglect his example: for I premit the land-fowl to follow one another, undivided by the water-fowl, the grallæ and anſeres of his ſyſtem*; but, in my generical arrangement, I moſt punctually attend to the order he has given in his ſeveral diviſions, except in thoſe of his anſeres, and a few of his grallæ. For, after the manner of Mr Briſſon, I make a diſtinct order of water-fowl with pinnated feet, placing them between the waders or cloven-footed water-fowl and the web-footed. The oſtrich, and land-birds with wings uſeleſs for flight, I place as a diſtinct order. The trumpeter (*pſophia Linnæi*), and the buſtards, I place at the end of the gallinaceous tribe. All are land-birds. The firſt multiparous, like the generality of the gallinaceous tribe; the laſt granivorous, ſwift runners, avoiders of wet-places; and both have bills ſomewhat arched. It muſt be confeſſed, that both have legs naked above the knees; and the laſt, like the waders, lay but few eggs. They ſeem ambiguous birds that have affinity with each order; and it is hoped, that each naturaliſt may be indulged the toleration of placing them as ſuits his own opinion."

* *See Zoology.*

TABLE of *Pennant's* ARRANGEMENT, with the correſpondent ORDERS and GENERA in the SYSTEMA NATURÆ of *Linnæus*.

DIVISION I. LAND-BIRDS. DIV. II. WATER-FOWL.

		LINNÆI.
Diviſ. I.	Order I. Rapacious.	*Accipitres*
	II. Pies.	*Picæ.*
	III. Gallinaceous.	*Gallinæ*
	IV. Columbine.	*Paſſeres.*
	V. Paſſerine.	*Paſſeres.*
	VI. Struthious.	*Gallinæ.* *Grallæ.*

rrange-ment.

Divis. II.	Order VII. Cloven-footed or Waders.	*Grallæ.*
	VIII. Pinnated feet.	*Anſeres.* *Grallæ.*
	IX. Web-footed.	*Anſeres.* *Grallæ.*

DIV. I.

Ord. I. RAPACIOUS.

1	Vulture	*Vultur*	3	Owl	*Strix*
2	Falcon	*Falco*	4	Shrike	*Lanius*

Ord II. PIES.

5	Parrot	*Pſittacus*	17	Barbet	*Bucco*
6	Toucan	*Ramphaſtos*	18	Cuckoo	*Cuculus*
7	Motmot	*Ramphaſtos*	19	Wryneck	*Junx*
8	Hornbill	*Buceros*	20	Woodpecker	*Picus*
9	Beefeater	*Buphaga*	21	Jacamar	*Alcedo*
10	Ani	*Crotophaga*	22	Kingsfiſher	*Alcedo*
11	Crow	*Corvus*	23	Nuthatch	*Sitta*
12	Roller	*Coracias*	24	Tody	*Todus*
13	Oriole	*Oriolus*	25	Bee-eater	*Merops*
14	Grakle	*Gracula*	26	Hoopoe	*Upupa*
15	Paradiſe	*Paradiſæa*	27	Creeper	*Certhia*
16	Curucui	*Trogon*	28	Honeyſucker	*Trochilus*

Ord. III. GALLINACEOUS.

29	Cock	*Phaſianus*	34	Pheaſant	*Phaſianus*
30	Turkey	*Meleagris*	35	Grous	*Tetrao*
31	Pintado	*Numida*	36	Partridge	*Tetrao*
32	Curaſſo	*Crax*	37	Trumpeter	*Pſophia*
33	Peacock	*Pavo*	38	Buſtard	*Otis*

Ord. IV. COLUMBINE.

39	Pigeon	*Columba*

Ord. V. PASSERINE.

40	Stare	*Sturnus*	41	Thruſh	*Turdus*
42	Chatterer	*Ampelis*	43	Coly	*Loxia*
44	Groſbeak	*Loxia*	50	Wagtail	*Motacilla*
45	Bunting	*Emberiza*	51	Warblers	*Motacilla*
46	Tanager	*Tanagra*	52	Manakin	*Pipra*
47	Finch	*Fringilla*	53	Titmouſe	*Parus*
48	Flycatcher	*Muſcicapa*	54	Swallow	*Hirundo*
49	Lark	*Alauda*	55	Goatſucker	*Caprimulgus*

Ord. VI. STRUTHIOUS.

56	Dodo	*Didus*	57	Oſtrich	*Struthio*

DIV. II.

Ord. VII. CLOVEN-FOOTED, or WADERS.

58	Spoonbill	*Platalea*	66	Snipe	*Scolopax*
59	Screamer	*Palamedea*	67	Sandpiper	*Tringa*
60	Jabiru	*Mycteria*	68	Plover	*Charadrius*
61	Boatbill	*Cancroma*	69	Oyſtercatcher	*Hæmatopus*
62	Heron	*Ardea*	70	Jacana	*Parra*
63	Umbre	*Scopus* BRISS.	71	Pratincole	*Hirundo*
64	Ibis	*Tantalus*	72	Rail	*Rallus*
65	Curlew	*Scolopax*	73	Gallinule	*Fulica.*

Ord. VIII. PINNATED-FEET.

74	Phalarope	*Tringa*	76	Grebe	*Colymbus*
75	Coot	*Fulica*			

Ord. IX. WEB-FOOTED.

77	Avoſet	*Recurviroſtra*	86	Gull	*Larus*
78	Courier	*Currira* BRISS.	87	Petrel	*Procellaria*
79	Flammant	*Phœnicopterus*	88	Merganſer	*Mergus*
80	Albatroſs	*Diomedea*	89	Duck	*Anas*
81	Auk	*Alca*	90	Pinguin	*Diomedea* *Phaeton*
82	Guillemot	*Colymbus*			
83	Diver	*Colymbus*	91	Pelecan	*Pelecanus*
84	Skimmer	*Rhyncops*	92	Tropic	*Phaeton*
85	Tern	*Sterna*	93	Darter	*Plotus*

For *Linnæus's Arrangement*, ſee ZOOLOGY.

nitho-mancy, obus.

ORNITHOMANCY, a ſecies of divination performed by means of birds; being the ſame with augury. See DIVINATION and AUGURY.

OROBUS, BITTER VETCH; a genus of the decandria order, belonging to the diadelphia claſs of plants. There are nine ſpecies. All of them have fibrated roots, which are perennial, but are annual in ſtalk, riſing early in ſpring and decaying in autumn. They are very hardy plants, and proſper in any common ſoil of a garden. Moſt of the ſorts are very floriferous, and the flowers conſpicuous and ornamental for adorning the flower compartments. The flowers are univerſally of the papilionaceous or butterfly kind, conſiſting each of four irregular petals, *i. e.* a ſtandard, two wings, and a keel; and are all ſucceeded by long taper ſeed-pods, furniſhing plenty of ripe ſeed in autumn; by which the plants may be propagated abundantly, as alſo by parting the roots.

The Scots Highlanders have a great eſteem for the tubercles of the roots of the tuberoſus, or ſpecies ſometimes called *wood-pea*. They dry and chew them in general to give a better reliſh to their liquor; they alſo affirm that they are good againſt moſt diſorders of the breaſt, and that by the uſe of them they are enabled to reſiſt hunger and thirſt for a long time. In Breadalbane and Roſsſhire, they ſometimes bruiſe and ſteep them in water, and make an agreeable fermented liquor with them. They have a ſweet taſte, ſomething like the roots of liquorice; and when boiled, we are told, they are nutritious and well flavoured; and in times of ſcarcity, they have ſerved as a ſubſtitute for bread.

Oroonoko || Orpheus.

OROONOKO, a great river of terra firma, in South America, which riſes in Popayan, and falls into the ſea with 16 mouths.

ORPHAN, a fatherleſs child, or minor; or one that is deprived both of father and mother.

ORPHEUS, a celebrated poet and muſician of antiquity. His reputation was eſtabliſhed as early as the time of the Argonautic expedition, in which he was himſelf an adventurer; and is ſaid by Apollonius Rhodius not only to have incited the Argonauts to row by the ſound of his lyre, but to have vanquiſhed and put to ſilence the ſirens by the ſuperiority of his ſtrains. Yet, notwithſtanding the great celebrity he had ſo long enjoyed, there is a paſſage in Cicero, which ſays, that Ariſtotle, in the third book of his *Poetics*, which is now loſt, *doubted if ſuch a perſon as Orpheus ever exiſted*. But as the work of Cicero, in which this paſſage occurs, is in dialogue, it is not eaſy to diſcover what was his own opinion upon the ſubject, the words cited being put into the mouth of Caius Cotta. And Cicero, in other parts of his writings, mentions Orpheus as a perſon of whoſe exiſt-

Arrangement.

ence he had no doubts. There are ſeveral ancient authors, among whom is Suidas, who enumerates five perſons of the name of *Orpheus*, and relates ſome particulars of each. And it is very probable that it has fared with Orpheus as with Hercules, and that writers have attributed to *one* the actions of *many*. But, however that may have been, we ſhall not attempt to collect all the fables that poets and mythologiſts have invented concerning him; they are too well known to need inſertion here. We ſhall, therefore, in ſpeaking of him, make uſe only of ſuch materials as the beſt ancient hiſtorians, and the moſt reſpectable writers among the moderns, have furniſhed towards his hiſtory.

Dr Cudworth, in his *Intellectual Syſtem*, after examining and confuting the objections that have been made to the being of an Orpheus, and with his uſual learning and abilities clearly eſtabliſhing his exiſtence, proceeds, in a very ample manner, to ſpeak of the opinions and writings of our bard, whom he regards not only as the firſt muſician and poet of antiquity, but as a great mythologiſt, from whom the Greeks derived the Thracian religious rites and myſteries.

"It is the opinion (ſays he) of ſome eminent philologers of later times, that there never was any ſuch perſon as Orpheus, except in Fairy-land; and that his whole hiſtory was nothing but a mere romantic allegory, utterly devoid of truth and reality. But there is nothing alleged for this opinion from antiquity, except the one paſſage of Cicero concerning Ariſtotle: who ſeems to have meant no more than this, that there was no ſuch poet as Orpheus, anterior to Homer; or that the verſes vulgarly called *Orphical*, were not written by Orpheus. However, if it ſhould be granted that Ariſtotle had denied the exiſtence of ſuch a man, there ſeems to be no reaſon why his ſingle teſtimony ſhould preponderate againſt the univerſal conſent of all antiquity: which agrees, that Orpheus was the ſon of Oeager, by birth a Thracian, the father or chief founder of the mythological and allegorical theology amongſt the Greeks, and of all their moſt ſacred religious rites and myſteries; who is commonly ſuppoſed to have lived before the Trojan war, that is, in the time of the Iſraelitiſh judges, or at leaſt to have been ſenior both to Heſiod and Homer; and to have died a violent death, moſt affirming that he was torn in pieces by women. For which reaſon, in the viſion of Herus Pamphylius, in Plato, Orpheus's ſoul paſſing into another body, is ſaid to have choſen that of a ſwan, a reputed muſical animal, on account of the great hatred he had conceived for all women, from the death which they had inflicted on him. And the hiſtoric truth of Orpheus was not only acknowledged by Plato, but alſo by Iſocrates, who lived before Ariſtotle, in his oration in praiſe of Buſiris; and confirmed by the grave hiſtorian Diodorus Siculus, who ſays, that Orpheus diligently applied himſelf to literature, and when he had learned τα μυθολογυμενα, or the mythological part of theology, he travelled into Egypt, where he ſoon became the greateſt proficient among the Greeks in the myſteries of religion, theology, and poetry. Neither was his hiſtory of Orpheus contradicted by Origen, when ſo juſtly provoked by Celſus, who had preferred him to our Saviour; and, according to Suidas, Orpheus the Thracian was the firſt inventor of the religious myſteries of the Greeks, and that religion was thence called *Threſkeia*, as it was a Thracian invention. On account of the great antiquity of Orpheus, there have been numberleſs fables intermingled with his hiſtory, yet there appears no reaſon that we ſhould diſbelieve the exiſtence of ſuch a man."

The biſhop of Glouceſter ſpeaks no more doubtfully of the exiſtence of Orpheus, than of Homer and Heſiod, with whom he ranks him, not only as a poet, but alſo as a theologian, and founder of religion.

The family of Orpheus is traced by Sir Iſaac Newton for ſeveral generations: "Seſac paſſing over the Helleſpont, conquers Thrace; kills Lycurgus, king of that country; and gives his kingdom and one of his ſinging-women to Oeagrus, the ſon of Tharops, and father of Orpheus; hence Orpheus is ſaid to have had the muſe Calliope for his mother."

He is allowed by moſt ancient authors to have excelled in poetry and muſic, particularly the latter; and to have early cultivated the lyre, in preference to every other inſtrument: ſo that all thoſe who came after him were contented to be his imitators; whereas he adopted no model, ſays Plutarch; for before his time no other muſic was known, except a few airs for the flute. Muſic was ſo cloſely connected in ancient times with the moſt ſublime ſciences, that Orpheus united it not only with philoſophy, but with theology. He abſtained from eating animal food; and held eggs in abhorrence as aliment, being perſuaded that the egg ſubſiſted before the chicken, and was the principle of all exiſtence: both his knowledge and prejudices, it is probable, were acquired in Egypt, as well as thoſe of Pythagoras many ages after.

Burney's Hiſt. of Muſic, p. 320 &c

With reſpect to his abſtaining from the fleſh of oxen, Geſner ſuppoſes it may have proceeded from the veneration ſhewn to that animal ſo uſeful in tillage, in the Eleuſinian myſteries, inſtituted in honour of Ceres, the goddeſs of agriculture. He might have added that, as theſe myſteries were inſtituted in imitation of thoſe eſtabliſhed in Egypt in honour of Oſiris and Iſis, this abſtinence from animal food was of the the origin, and a particular compliment to Apis. But like abbé Fraguier, in an ingenious diſſertation upon the *Orphic Life*, gives ſtill more importance to the prohibition; for as Orpheus was the legiſlator and humanizer of the wild and ſavage Thracians, who were canibals, a total abolition of eating human fleſh could only be eſtabliſhed by obliging his countrymen to abſtain from every thing that had life.

With reſpect to theology, Diodorus Siculus tells us, that his father Oeagrus gave him his firſt inſtructions in religion, imparting to him the myſteries of Bacchus, as they were then practiſed in Thrace. He became afterwards a diſciple of the Idæi Dactyli in Crete, and there acquired new ideas concerning religious ceremonies. But nothing contributed ſo much to his ſkill in theological matters, as his journey into Egypt; where being initiated into the myſteries of Iſis and Oſiris, or of Ceres and Bacchus, he acquired a knowledge concerning initiations, expiations, funeral rites, and other points of religious worſhip, far ſuperior to any one of his age and country. And being

Orpheus.

much connected with the deſcendants of Cadmus, the founder of Thebes in Bæotia, he reſolved, in order to honour their origin, to tranſport into Greece the whole fable of Oſiris, and apply it to the family of Cadmus. The credulous people eaſily received this tale, and were much flattered by the inſtitution of the ceremonies in honour of Oſiris. Thus Orpheus, who was held in great veneration at the Grecian Thebes, of which he was become a citizen, admirably adapted this fable, and render it reſpectable, not only by his beautiful verſes, and manner of ſinging them, but by the reputation he had acquired of being profoundly ſkilled in all religious concerns.

At his return into Greece, according to Pauſanias, he was held in the higheſt veneration by the people, as they imagined he had diſcovered the ſecret of expiating crimes, purifying criminals, curing diſeaſes, and appeaſing the angry gods. He formed and promulgated an idea of a hell, from the funeral ceremonies of the Egyptians, which was received throughout all Greece. He inſtituted the myſteries and worſhip of Hecate among the Eginetes, and that of Ceres at Sparta.

Juſtin Martyr ſays, that he introduced among the Greeks near 360 gods; Heſiod and Homer purſued his labours, and followed the ſame clue, agreeing in the like doctrines, having all drank at the ſame Egyptian fountain.

Profane authors look upon Orpheus as the inventor of that ſpecies of magic called *evocation of the manes*, or raiſing ghoſts; and indeed the hymns which are attributed to him are moſtly pieces of incantation, and real conjuration. Upon the death of his wife Eurydice, he retired to a place in Threſprotia, called *Aornas*, where an ancient oracle gave anſwers to ſuch as evoked the dead. He there fancied he ſaw his dear Eurydice, and at his departure flattered himſelf that ſhe followed him; but upon looking behind him, and not ſeeing her, he was ſo afflicted, that he ſoon died of grief.

There were perſons among the ancients who made public profeſſion of conjuring up ghoſts, and there were temples where the ceremony of conjuration was to be performed. Pauſanias ſpeaks of that which was in Theſprotia, where Orpheus went to call up the ghoſt of his wife Eurydice. It is this very journey, and the motive which put him upon it, that made it believed he went down into hell.

But it is not only the poets who ſpeak of conjuring up ſpirits; examples of it are to be found both in ſacred and profane hiſtory. Periander, the tyrant of Corinth, viſited the Theſprotians, to conſult his wife about ſomething left with her in truſt; and we are told by the hiſtorians, that the Lacedæmonians having ſtarved Pauſanias their general to death, in the temple of Pallas, and not being able to appeaſe his manes, which tormented them without intermiſſion, ſent for the magicians from Theſſaly, who, when they had called up the ghoſts of his enemies, ſo effectually put to flight the ghoſt of Pauſanias, that it never more choſe to ſhew its face.

The poets have embelliſhed this ſtory, and given to the lyre of Orpheus, not only the power of ſilencing Cerberus, and of ſuſpending the torments of Tartarus, but alſo of charming even the infernal deities themſelves, whom he rendered ſo far propitious to his intreaties as to reſtore to him Eurydice, upon condition that he would not look at her till he had quitted their dominions; a bleſſing which he ſoon forfeited by a too eager and fatal curioſity.

Orpheus.

All dangers paſt, at length the lovely bride
In ſafety goes, with her melodious guide;
Longing the common light again to ſhare,
And draw the vital breath of upper air:
He firſt, and cloſe behind him follow'd ſhe;
For ſuch was Proſerpine's ſevere decree.
When ſtrong deſires th' impatient youth invade,
By little caution, and much love betray'd:
A fault which eaſy pardon might receive,
Were lovers judges, or could hell forgive.
For near the confines of etherial light,
And longing for the glimm'ring of a ſight,
Th' unwary lover caſt a look behind,
Forgetful of the law, nor maſter of his mind.
Straight all his hopes exhal'd in empty ſmoke;
And his long toils were forfeit for a look.

DRYDEN'S Virgil.

Tzetzes explains the fable of his drawing his wife Eurydice from hell, by his great ſtill in medicine, with which he prolonged her life, or, in other words, ſnatched her from the grave. Æſculapius, and other phyſicians, have been ſaid to have raiſed from the dead, thoſe whom they had recovered from dangerous diſeaſes.

The biſhop of Glouceſter, in his learned, ample, and admirable account of the Eleuſinian myſteries, ſays, "While theſe myſteries were confined to Egypt their native country, and while the Grecian lawgivers went thither to be initiated, as a kind of deſignation to their office, the ceremony would be naturally deſcribed in terms highly allegorical. This way of ſpeaking was uſed by Orpheus, Bacchus, and others; and continued even after the myſteries were introduced into Greece, as appears by the fables of Hercules, Caſtor, Pollux, and Theſeus's deſcent into hell; but the allegory was ſo circumſtanced, as to diſcover the truth concealed under it. So Orpheus is ſaid to get to hell by the power of his harp:

Thrëicia fretus citharâ, fidibuſque canoris.

VIRG. *Æn.* VI. *ver.* 119.

That is, in quality of lawgiver; the harp being the known ſymbol of his laws, by which he humanized a rude and barbarous people.—Had an old poem, under the name of *Orpheus*, entitled, *A deſcent into Hell*, been now extant, it would perhaps have ſhewn us, that no more was meant than Orpheus's *initiation.*"

Many ancient writers, in ſpeaking of his death, relate, that the Thracian women, enraged at being abandoned by their huſbands, who were diſciples of Orpheus, concealed themſelves in the woods, in order to ſatiate their vengeance; and, notwithſtanding they poſtponed the perpetration of their deſign ſome time thro' fear, at length, by drinking to a degree of intoxication, they ſo far fortified their courage as to put him to death. And Plutarch aſſures us, that the Thracians ſtigmatized their women, even in his time, for the barbarity of this action.

Our venerable bard is defended by the author of the *Divine Legation*, from ſome inſinuations to his diſadvantage in Diogenes Laertius. "It is true (ſays he) if uncertain report was to be believed, the myſteries were corrupted very early; for Orpheus himſelf is ſaid to have abuſed them. But this was an art the debauched myſtæ of later times employed to varniſh their enormities; as the deteſted pederaſts of after-ages, ſcandalized the blameleſs Socrates. Beſides, the ſtory is ſo ill laid, that it is detected by the ſureſt records of antiquity: for in conſequence of what they fabled of Orpheus in the myſteries, they pretended he was torn in pieces by the women; whereas it appeared from the inſcription on his monument at Dium in Macedonia, that he was ſtruck dead with lightning, the envied death of the reputed favourites of the gods."

This monument at Dium, conſiſting of a marble urn on a pillar, was ſtill to be ſeen in the time of Pauſanias. It is ſaid, however, that his ſepulchre was removed from Libethra, upon mount Olympus, where Orpheus was born, and from whence it was transferred to Dium by the Macedonians, after the ruin of Libethra by a ſudden inundation which a dreadful ſtorm had occaſioned. This event is very minutely related by Pauſanias.

Virgil beſtows the firſt place in his Elyſium upon the legiſlators, and *thoſe who brought mankind from a ſtate of nature into ſociety:*

> *Magnanimi heroës, nati melioribus annis.*

At the head of theſe is Orpheus, the moſt renowned of the European law-givers, but better known under the character of poet: for the firſt laws being written in meaſure, to allure men to learn them, and, when learnt, to retain them, the fable would have it, that by the force of harmony Orpheus ſoftened the ſavage inhabitants of Thrace:

> ———*Threïcius longa cum veſte ſacerdos*
> *Obloquitur numeris ſeptum diſcrimina vocum:*
> *Jamque eadem digitis, jam pectine pulſat eburno.*
> Æn. *lib.* vi. *ver.* 645.

The ſeven ſtrings given by the poet in this paſſage to the lyre of Orpheus, is a circumſtance ſomewhat hiſtorical. The firſt Mercurean lyre had, at moſt, but four ſtrings. Others were afterwards added to it by the ſecond Mercury, or Amphion: but according to ſeveral traditions preſerved by Greek hiſtorians, it was Orpheus who completed the ſecond tetrachord, which extended the ſcale to a heptachord, or *ſeven ſounds*, implied by the *ſeptem diſcrimina vocum.* For the aſſertion of many writers, that Orpheus added two new ſtrings to the lyre, which before had ſeven, claſhes with the claims of Pythagoras to the invention of the octachord, or addition of the ſound *proſlambanomenos* to the heptachord, of which almoſt all antiquity allows him to have been the inventor. And it is not eaſy to ſuppoſe, that the lyre ſhould have been repreſented in ancient ſculpture with four or five ſtrings only, if it had had nine ſo early as the time of Orpheus, who flouriſhed long before ſculpture was known in Greece. See the article Lyre.

With reſpect to the writings of Orpheus, he is mentioned by Pindar as author of the Argonautics, and Herodotus ſpeaks of his Orphics. His hymns, ſays Pauſanias, were very ſhort, and but few in number: the Lycomides, an Athenian family, knew them by heart, and had an excluſive privilege of ſinging them, and thoſe of their old poets, Muſæus, Onomacritus, Pamphus, and Olen, at the celebration of the Eleuſinian myſteries; that is, the prieſthood was hereditary in this family.

Jamblicus tells us, that the poems under the name of *Orpheus* were written in the Doric dialect, but have ſince been tranſdialected, or moderniſed. It was the common opinion in antiquity that they were genuine; but even thoſe who doubted of it, gave them to the earlieſt Pythagoreans, and ſome of them to Pythagoras himſelf, who has frequently been called the *follower of Orpheus*, and been ſuppoſed to have adopted many of his opinions.

Of the poems that are ſtill ſubſiſting under the name of *Orpheus*, which were collected and publiſhed at Nuremberg 1702, by Andr. Chriſt. Eſchenbach, and which have been ſince reprinted at Leipſic 1764, under the title of ΟΡΦΕΩΣ ΑΠΑΝΤΑ, ſeveral have been attributed to Onimacritus, an Athenian, who flouriſhed under the Pyſiſtratidæ, about 500 years before Chriſt. Their titles are, 1. The Argonautics, an epic poem. 2. Eighty-ſix hymns; which are ſo full of incantations and magical evocation, that Daniel Heinſius has called them *veram Satanæ liturgiam*, "the true liturgy of the devil." Pauſanias, who made no doubt that the hymns ſubſiſting in his time were compoſed by Orpheus, tells us, that tho' leſs elegant, they had been preferred for religious purpoſes to thoſe of Homer. 3. *De lapidibus*, a poem on precious ſtones. 4. Fragments, collected by Henry Stevens. Orpheus has been called the *inventor*, or at leaſt the *propagator*, of many arts and doctrines among the Greeks. 1. The *combination of letters*, or the art of writing. 2. *Muſic*, the lyre, or cithara, of ſeven ſtrings, adding three to that of Mercury. 3. *Hexameter verſe*. 4. *Myſteries* and *theology*. 5. *Medicine*. 6. *Magic* and *divination*. 7. *Aſtrology*. Servius upon the ſixth *Æneid*, p. 450, ſays Orpheus firſt inſtituted *the harmony of the ſpheres*. 8. He is ſaid likewiſe to have been the firſt who imagined *a plurality of worlds*, or that the moon and planets were inhabited.

ORPIMENT, in natural hiſtory, a foſſile ſubſtance uſually found in copper-mines, compoſed of thin flakes like the talcs; theſe eaſily ſplit, are flexible, not elaſtic, ſoluble in oil, fuſible in a moderate fire, and yield in burning an offenſive ſmell like garlic.

ORPINE, in botany. See Sedum.

ORRERY, a curious machine for repreſenting the motions or phaſes of the heavenly bodies. See Astronomy, nº 317.

It would be too great an undertaking here to give an account of the mechaniſm of the larger ſort of orreries, which repreſent the movements of all the heavenly bodies; nor indeed can it be done either by diagram or deſcription, to render it intelligible to the moſt diſcerning reader: but, inſtead of that, we ſhall exhibit an idea of the theory and ſtructure of an uſeful, conciſe, and portable planetarium, which any gentleman may have made for a ſmall expence, and will exhibit, very juſtly, the motions of all the primary planets about the ſun, by wheel-work; and thoſe that have ſecondaries, or moons, may have them placed about their primaries moveable by the hand, ſo that the whole ſhall be a juſt repreſentation of the ſolar ſyſtem, or true ſtate of the heavens, for any given time of the year.

Orrery
||
Orſato.

In order to this we muſt compare, and find out the proportion, which the periodical times, or revolutions of the primary planets, bear to that of the earth: And they are ſuch as are expreſſed in the table below, where the firſt column is the time of the earth's period in days and decimal parts; the ſecond, that of the planets; the third and fourth are numbers in the ſame proportion to each other: as,

365,25 : 88 ☿ : : 83 : 20, for Mercury.
365,25 : 224,7 ♀ : : 52 : 32, for Venus.
365,25 : 686,9 ♂ : : 40 : 75, for Mars.
365,25 : 4332,5 ♃ : : 7 : 83, for Jupiter.
365,25 : 10759,3 ♄ : : 5 : 148, for Saturn.

If we now ſuppoſe a ſpindle or arbour with ſix wheels fixed upon it in an horizontal poſition, having the number of teeth in each, correſponding to the numbers in the third column, *viz.* the wheel AM of 83 teeth, BL of 52, CK of 50 (for the earth), DI of 40, EH of 7, and FG of 5; and another ſet of wheels moving freely about an arbor, having the number of teeth in the fourth column, *viz.* AN of 20, BO of 32, CP of 50 (for the earth), DQ of 75, ER of 83, and FS of 148; then, if thoſe two arbors of fixed and moveable wheels are made of the ſize, and fixed at the diſtance from each other, as here repreſented in the ſcheme, the teeth of the former will take thoſe of the latter, and turn them very freely when the machine is in motion.

ate
XXX.
5.

Theſe arbors, with their wheel, are to be placed in a box, of an adequate ſize, in a perpendicular poſition: the arbor of fixed wheels to move in pivots at the top and bottom of the box; and the arbor of moveable wheels to go thro' the top of the box, to a proper height, on the top of which is to be placed a round ball, gilt with gold to repreſent the ſun. On each of the moveable wheels is to be fixed a ſocket, or tube, aſcending above the top of the box, and having on the top a wire fixed, and bent at a proper diſtance into a right angle upwards, bearing on the top a ſmall round ball, repreſenting its proper planets.

If then on the lower part of the arbor of fixed wheels be placed a pinion of ſcrew-teeth, a winch turning a ſpindle with an endleſs ſcrew, playing in the teeth of the arbour, will turn it with all its wheels; and theſe wheels will move the others about, with their planets, in their proper and reſpective periods of time, very exactly. For while the fixed wheel CK moves its equal CP once round, the wheel AM will move AN a little more than four times round, and ſo will nicely exhibit the motion of Mercury; and the wheel FG will turn the wheel FS about $\frac{1}{29,5}$ round, and ſo will truly repreſent the motion of Saturn: and the ſame is to be obſerved of all the reſt.

ORRERY (Earls of). See BOYLE.

ORRICE. See IRIS.

ORSATO (Sertorio), a celebrated antiquarian, hiſtorian, and poet, was born at Padua, in 1617, and early diſcovered a taſte for literature and the ſciences. He applied himſelf to ſearching out antiquities and ancient inſcriptions; for which purpoſe he travelled thro' all the different parts of Italy, and in the mean time poetry was his amuſement. When advanced in age, he taught natural philoſophy in the univerſity of Padua. He was alſo a member of the academy of the Ricovrati. Having preſented to the doge and ſenate of Venice, the hiſtory of Padua, which he had dedicated to them, he made a long ſpeech, during which he ſtruggled with a natural want, and died of ſuppreſſion of urine, on the 3d of July 1678. He wrote a great number of books which are eſteemed, ſome in Latin, and others in Italian.

Orſi
||
Orthography.

He ought not to be confounded with *John Baptiſt* ORSATO, an able phyſician and antiquary, who was born at Padua, in 1673, and wrote, 1. *Diſſertatio epiſtolaris de Lucernis antiquis.* 2. A diſſertation *De patera antiquorum.* 3. A ſmall treatiſe *De ſternis veterum;* and ſome other works.

ORSI (John Joſeph), an ingenious philologer and poet, was born at Bologna in the year 1652; and ſtudied polite literature, philoſophy, the civil law, and mathematics. His houſe was a kind of academy, where many perſons of literature regularly aſſembled. He wrote many ingenious ſonnets, paſtorals, and other works in Italian, and died in 1733.

ORTEGAL CAPE, the moſt northern promontory of Spain, where there is alſo a caſtle of the ſame name. W. Long. 8. 20. N. Lat. 44. 0.

ORTELIUS (Abraham), a celebrated geographer, born at Antwerp, in 1527, was well ſkilled in the languages and the mathematics; and acquired ſuch reputation by his ſkill in geography, that he was ſurnamed the *Ptolemy of his time.* Juſtus Lipſius, and moſt of the great men of the 16th century, were Ortelius's friends. He reſided at Oxford, in the reign of Edward VI. and came a ſecond time into England, in 1577. His *Theatrum Orbis* was the completeſt work of the kind that had ever been publiſhed, and gained him a reputation equal to his immenſe labour in compiling it. He alſo wrote ſeveral other excellent geographical works; the principal of which are his *Theſaurus,* and his *Synonima Geographica.* The world is likewiſe obliged to him for the *Britannia,* which he perſuaded Cambden to undertake. He died at Antwerp, in 1598.

ORTHODOX, in church-hiſtory, an appellation given to thoſe who are ſound in all the articles of the Chriſtian faith.

ORTHOGRAPHIC PROJECTION *of the* SPHERE, that wherein the eye is ſuppoſed to be at an infinite diſtance; ſo called, becauſe the perpendiculars from any point of the ſphere will all fall in the common interſection of the ſphere with the plane of the projection. See GEOGRAPHY, nº 13. 41. and PROJECTION.

ORTHOGRAPHY, that part of grammar which teaches the nature and affections of letters, and the juſt method of ſpelling or writing words, with all the proper and neceſſary letters; making one of the four greateſt diviſions or branches of grammar. See GRAMMAR.

ORTHOGRAPHY, in geometry, the art of drawing or delineating the fore-right plan of any object, and of expreſſing the heights or elevations of each part. It is called *Orthography*, for its determining things by perpendicular lines falling on the geometrical plane.

ORTHOGRAPHY, in architecture, the elevation of a building.

ORTHOGRAPHY, in perſpective, is the fore right ſide of any plane, *i. e.* the ſide or plane that lies parallel to a ſtraight line, that may be imagined to paſs through the outward convex points of the eyes, continued to a convenient length.

ORTHOPNOEA, a ſpecies or degree of aſthma, where there is ſuch a difficulty of reſpiration, that the patient is obliged to ſit or ſtand upright, in order to be able to breathe. See MEDICINE, n° 396.

ORTNAU, a county of Germany, in the circle of Suabia, lying along the Rhine, and ſeparating it from Alſace. It is bounded on the ſouth by Breſlau, on the north by the margravate of Baden, and on the eaſt by the duchy of Wirtemberg. It contains three imperial towns; namely, Offenburg, Gegenbach, and Zell. It belongs partly to the houſe of Auſtria, partly to the biſhopric of Spire, and partly to the county of Hannau.

ORTIVE, in aſtronomy, the ſame with *eaſtern*. The ortive or eaſtern amplitude, is an arch of the horizon intercepted between where a ſtar riſes, and the eaſt point of the horizon, or point where the horizon and equator interſect.

ORVIETO, a town of Italy in the patrimony of St Peter, with a biſhop's ſee and a magnificient palace. In this place there is a deep well, into which mules deſcend by one pair of ſtairs to fetch up water, and aſcend by another. It is ſeated on a craggy rock, near the confluence of the rivers Pagli and Chiana. E. Long. 12. 10. N. Lat. 42. 42.

ORYZA, RICE; a genus of the digynia order, belonging to the hexandria claſs of plants. There is but one ſpecies, namely the ſativa or common rice. This plant is greatly cultivated in moſt of the eaſtern countries, where it is the chief ſupport of the inhabitants; and great quantities of it are brought into England and other European countries every year, where it is much eſteemed for puddings, &c. it being too tender to be produced in theſe northern countries without the aſſiſtance of artificial heat; but from ſome ſeeds which were formerly ſent to Carolina, there have been great quantities produced, and it is found to ſucceed as well there as in the eaſtern countries.

This plant grows upon moiſt ſoils, where the ground can be flowed over with water after it is come up. So that whoever would cultivate it in this country ſhould ſow the ſeeds upon a hot-bed; and when the plants are come up, they ſhould be removed into pots filled with light rich earth, and placed in pans of water, which ſhould be plunged into a hot-bed; and, as the water waſtes, it muſt from time to time be renewed again. In July theſe plants may be ſet abroad in a warm ſituation, ſtill preſerving the water in the pans, otherwiſe they will not thrive; and, toward the latter end of Auguſt, they will produce their grain, which will ripen tolerably well, provided the autumn proves favourable.—The leaves of rice are long, like the reed, and fleſhy; the flowers blow on the top, like barley; but the ſeed which follows is diſpoſed in cluſters, each of which is incloſed in a yellow huſk, ending in a ſpiral thread. The ſeed is oblong, or rather oval and white.

Rice is the chief commodity and riches of Damieta in Egypt. Dr Haſſelquiſt gives the following deſcription of the manner in which they dreſs and ſeparate it from the huſks. "It is pounded by hollow iron peſtles of a cylindrical form, lifted up by a wheel worked by oxen. A perſon ſitting between the two peſtles, puſhes forward the rice when the peſtles are riſing; another ſifts, winnows, and lays it under the peſtles. In this manner they continue working it until it is entirely free from chaff and huſks. When clean, they add a 30th part of ſalt, and pound them together; by which the rice, formerly grey, becomes white. After this purification, it is paſſed through a fine ſieve to part the ſalt from the rice; and then it is ready for ſale." Damieta ſells every year 60,800 ſacks of rice, the greateſt part of which goes to Turky, ſome to Leghorn, Marſeilles, and Venice.

Rice, according to Dr Cullen, is preferable to all other kinds of grain, both for largeneſs of produce, quantity of nouriſhment, and goodneſs. This, he ſays, is plain from macerating the different grains in water; for, as the rice ſwells to the largeſt ſize, ſo its parts are more intimately divided. Rice is ſaid to affect the eyes; but this it purely prejudice. Thus it is alleged a particular people of Aſia, who live on this grain, are blind-eyed: but if the ſoil be ſandy, and not much covered with herbage, and as theſe people are much employed in the field, this affection of their eyes may be owing to the ſtrong reflection of the rays of light from this ſandy ſoil; and our author is the more inclined to this opinion, becauſe no ſuch effect is obſerved in Carolina, where rice is very commonly uſed.

Dr Percival informs us, that as a wholeſome nouriſhment, rice is much inferior to ſalep. He digeſted ſeveral alimentary mixtures prepared of mutton and water, beat up with bread, ſea-biſcuit, ſalep, rice flour, ſago powder, potato, old cheeſe, &c. in a heat equal to that of the human body. In 48 hours they had all acquired a vinous ſmell, and were in briſk fermentation, except the mixture with rice, which did not emit many air-bubbles, and was but little changed. The third day ſeveral of the mixtures were ſweet, and continued to ferment; others had loſt their inteſtine motion, and were ſour; but the one which contained the rice was become putrid. From this experiment it appears that rice, as an aliment, is ſlow of fermentation, and a very weak corrector of putrefaction. It is therefore an improper diet for hoſpital patients; but more particularly for ſailors, in long voyages, becauſe it is incapable of preventing, and will not contribute much to check the progreſs of, that fatal diſeaſe, the ſea-ſcurvy. Under certain circumſtances, rice ſeems diſpoſed of itſelf, without mixture, to become putrid. For by long keeping, it ſometimes acquires an offenſive fœtor. Nor, according to our author, can it be conſidered as a very nutritive kind of food, on account of its difficult ſolubility in the ſtomach. Experience confirms the truth of this concluſion; for it is obſerved by the planters in the Weſt-Indies, that the negroes grow thin, and are leſs able to work, whilſt they ſubſiſt upon rice.

OSBORN (Francis), an eminent Engliſh writer in the 17th century. He was educated in a private manner; and at ripe years frequented the court, and was maſter of the horſe to William earl of Pembroke. Upon the breaking out of the civil wars, he adhered to the parliament party, and had ſeveral public employments conferred upon him. In the latter part of his life he lived at Oxford, in order to print ſeveral books, and to look after his ſon, for whom, by the favour of the parliament, he procured a fellowſhip in All-ſouls college. His Advice to a Son, ſo ſoon as it was publiſhed, being complained of to Dr John Tenant, vice-chancellor of Oxford, as of irreligious tendency, there was a propoſal made to have it publicly burnt; but that taking no effect, it was ordered that no bookſeller or others ſhould ſell it, which only made it ſell the faſter. He wrote alſo Hiſtorical Memoirs of the reigns of queen Elizabeth and king James I.; A Diſcourſe on the greatneſs and corruption of the church of Rome; A Diſcourſe upon Machiavel, &c. He died in 1659.

OSIRIS, the ſon of Jupiter and Niobe, reigned over the Argives; but afterwards delivered his kingdom to his brother Ægialeus, and took a voyage into Egypt, of which he made himſelf maſter, and married Io or Iſis. He eſtabliſhed good laws there, and they were both after their death worſhipped as gods.

OSNABURG, a biſhopric of Germany, ſituated in the centre of the circle of Weſtphalia between the Weſer and the Ems, having Minden on the eaſt, Munſter on the weſt, Diepholt on the north-eaſt, and Ravenſburg on the ſouth-weſt. It is about 45 miles long and 25 broad, producing ſome rye, ſeveral ſorts of turf, coals, marble, aud good paſturage. The inhabitants, who are a mixture of Proteſtants and Roman-catholics, breed a conſiderable number of cattle, eſpecially hogs, of which they make excellent bacon and hams; but a great part of the country conſiſts of heaths. By the treaty concluded here in 1648, the biſhopric was to be an alternative between the Roman-catholics and Lutherans; and the Lutheran biſhop was to be a younger prince of the houſe of Brunſwic Lunenburg, or, on failure thereof, of Brunſwic Wolfenbuttle. In conſequence of this ſettlement, his Britannic majeſty's ſecond ſon is now biſhop of Oſnaburg. The biſhop is able to raiſe 2500 men, his revenue being between 20,000 and 30,000 l. The chief manufactures of the country are a coarſe kind of linen cloth and yarn, which are ſaid to bring into it annually above 1,000,000 of rix-dollars. There are alſo ſome woollen manufactures in Oſnaburg and Bramſche. The land-eſtates of the biſhopric, are the chapter, the knights, and the four towns. The diets are held at Oſnaburg, when called together by the biſhop. The count of Bar is hereditary ſeneſchal or ſteward, and preſident of the college of knights. The biſhop is a prince of the empire; and, in the matricula, is rated at 6 horſe and 36 foot, or 216 florins monthly in lieu of them. To the chamber of the empire he contributes, each term, 81 rix-dollars, 14 kruitzers and a half. The capital of this biſhopric is

OSNABRUG, or *Oſnabruck*. It was formerly an imperial city, and one of the Hanſe-towns; but is now ſubject to the biſhop, though it ſtill enjoys many privileges, and a revenue of about 8000 or 9000 rix-dollars. It has its name from a bridge over the river Haſe, or Oſe, which divides it into the Old and New Town, and ſtands 67 miles weſt of Hanover, and 30 north-eaſt of Munſter, being ſurrounded with walls and ditches, but commanded by a mountain within cannon-ſhot. The magiſtracy of this city, which is rechoſen yearly on the ſecond of January, is Lutheran; and the churches belong, ſome to the Lutherans, and ſome to the Papiſts. Both parties have the full and free exerciſe of their religion, whether the biſhop is Proteſtant or Papiſt. The biſhop's palace was built by biſhop Erneſt-Auguſtus, brother to king George I. It is well fortified, and ſeparated from the town by a bridge. In one of the apartments of it died king George I. in the arms of his brother, on the 11th of June 1722. This was the firſt town in Weſtphalia which received the Lutheran doctrine.

OSNABURG *Iſland*, one of the iſlands in the South Sea diſcovered by captain Wallis in 1767. It is a high, round iſland, not above a league in circuit; in ſome parts covered with trees, in others a naked rock. S. Lat. 22. 48. W. Long. 141. 34.

OSSA, a mountain of Theſſaly, near the Peneus, which runs between this mountain and Olympus; famous in the fabulous ſtory of the giants, (Homer, Virgil, Horace, Seneca, Ovid.) The bending and unbending of its pines, on the blowing of a ſtrong north wind, formed a claſhing ſound like thunder, (Lucan.)

OSSAT (Arnauld de), born in the dioceſe of Auch in 1536, of mean parentage, was taken notice of by a gentleman in the dioceſe, who made him ſtudy with his ward the Lord of Caſtlenau de Magnoac. He ſtudied the law at Dijon under Cujace, and applied himſelf to the bar at Paris. He was ſecretary at Rome to M. de Foix, archbiſhop of Toulouſe; to cardinal Eſte; and afterwards to cardinal de Joyeuſe, by the French king's expreſs command. After riſing to the higheſt dignities both in church and ſtate, in 1599 he was created a cardinal by pope Clement VIII. He died in 1604. An eminent French writer gives him the following character. "He was a man of prodigious penetration; applied himſelf ſo cloſely to affairs, and eſpecially was ſo judicious in forming his reſolutions, that it is almoſt impoſſible to find out one falſe ſtep in the many negociations in which he was concerned." His works, and eſpecially his letters, have been much eſteemed in the learned world.

OSSIAN, the ſon of Fingal *, a celebrated Celtic poet, who flouriſhed about the end of the third and beginning of the fourth century. Several incidents in his poems point out this as his æra: particularly the engagement of Fingal with Caracul, or Caracalla, the ſon of the emperor Severus, ſtyled by Oſſian, The *Son of the King of the world*; and another expedition under the conduct of Oſcar, againſt the uſurper Carauſius, the Caros of Oſſian, who aſſumed the purple in the year 287. This correſponds pretty nearly with the account given by the Iriſh hiſtories, which place the death of Fingal in the year 283, and the death of Oſcar (who died many years before his father Oſſian) in the year 296.

At ſuch a diſtance of time, it cannot be expected we ſhould be able to give a particular account of the life of Oſſian. The firſt expedition on which his father ſent him was, to raiſe a ſtone on the banks of Crona, to perpetuate the memory of a victory which the king of Morven had obtained at that place. The Highlanders talk of this as being emblematical of that immortality which heroes were to receive from his future compoſitions. In this expedition he was accompanied by Toſcar, father to the beautiful Malvina, the amiable companion of his grief, after the death of her beloved Oſcar, his ſon. It appears from his poems, that, in one of his early expeditions to Ireland, he had fallen in love with and married Evirallin, daughter to Branno, petty king of Lego. "I went in ſuit of the maid of Lego's ſable ſurge; twelve of my people were there, the ſons of ſtreamy Morven. We came to Branno, friend of ſtrangers; Branno of the ſounding mail.—'From whence,' he ſaid, 'are the arms of ſteel? Not eaſy to win is the maid that has denied the blue-eyed ſons of Erin. But bleſt be thou, O ſon of Fingal! happy is the maid that waits thee. Though twelve daughters were mine, thine were the choice, thou ſon of fame.'—Then he opened the hall of the maid; the dark haired Evirallin ‡." This Evirallin was the mother of his ſon Oſcar, whoſe exploits he celebrates in many of his poems, and whoſe death he laments in the firſt book of Temora. Evirallin died ſome time before Oſcar, (Fing. B. iv.), who ſeems to have been her only child; and Oſſian did not marry afterwards: ſo that his poſterity ended in the death of Oſcar; who ſeems to have died as he was about to be married to Malvina, the daughter of Toſcar. Several of her lamentations for her lover are recorded by Oſſian, which paint her grief in the ſtrongeſt and moſt beautiful colours.—"It is the voice of my love! few are his viſits to my dreams.—But thou dwelleſt in the ſoul of Malvina, ſon of mighty Oſſian. My ſighs ariſe with the beams of the eaſt; my tears deſcend with the drops of night. I was a lovely tree in thy preſence, Oſcar, with all my branches round me: but thy death came like a blaſt from the deſart, and laid my green head low; the ſpring returned with its ſhowers, but no green leaf of mine aroſe." *Poem of* Croma.

---

* See the article FINGAL, in the APPENDIX.

The principal reſidence of Oſſian was in the vale of Cona, now Glenco, in Argyleſhire. See Fingal, in APPENDIX.

His poems relate many of his expeditions to Ireland, Scandinavia, Clyde, and Tweed or Teutha. His exploits on theſe occaſions, after making a large allowance for poetical exaggeration, ſhew him to have been no leſs a warrior than a poet. See Ossian's Works, in the poems *Calthon and Colmal*, *Lathmon*, *Berrathon*, &c. By theſe expeditions, which were always undertaken for the relief of the diſtreſſed, the mind of Oſſian ſeems to have been cultivated and enlarged beyond what is uſually to be met with in ſo rude a period of ſociety as that in which he lived. His poems breathe throughout, ſuch a ſpirit of generoſity and tenderneſs, eſpecially towards the fair ſex, as is ſeldom or never to be met with in the compoſitions of other poets who lived in a more advanced ſtate of civiliſation. He lived to an extreme old age; having ſurvived all his family and friends, many of whom periſhed by a fatal accident, recorded in one of his poems called the *Fall of Tura* *. Malvina, alone, the love of his ſon Oſcar, remained with him till within a few years of his death, and paid him every attention that could be expected from the tender relation in which ſhe ſtood to him. To her he addreſſes many of his poems, which ſeem to have been compoſed for the moſt part in his old age. Her death is pathetically lamented by him in the poem of *Berrathon*: towards the cloſe of which, he gives the preſages of his own departure; an event which he often wiſhes for, under the blindneſs and other calamities of his declining years. "Roll on, ye dark-brown years, for ye bring no joy on your courſe. Let the tomb open to Oſſian, for his ſtrength has failed. The ſons of the ſong are gone to reſt: my voice remains, like a blaſt, that roars, lonely, on the ſea-ſurrounded rock, after the winds are laid. The dark moſs whiſtles there, and the diſtant mariner ſees the waving trees †."—"But Oſſian is a tree that is withered. Its branches are blaſted and bare; no green leaf covers its boughs. From its trunk no young ſhoot is ſeen to ſpring. The breeze whiſtles in its grey moſs: the blaſt ſhakes its head of age.—The ſtorm will ſoon overturn it, and ſtrew all its dry branches with thee, O Dermid! and with all the reſt of the mighty dead, in the green winding vale of Cona *."

It is not certain at what age Oſſian died; but from his having been long blind with years, and from the many contraſts, between his preſent and paſt ſituations, in poems compoſed, as it would appear, at a conſiderable diſtance of time from each other, it is moſt likely he lived to an extreme old age. The current tradition is, that he died in the houſe of a Culdee, called the *Son of Alpin*, with whom he is ſaid to have held ſeveral conferences about the doctrines of Chriſtianity. One of theſe dialogues is ſtill preſerved, and bears the genuine marks of a very remote antiquity; (*Diſſertation* prefixed to *Oſſian's Works*.) Several of Oſſian's poems are addreſſed to this ſon of Alpin, who was probably one of thoſe Chriſtians whom the perſecution under Diocleſian had driven beyond the pale of the Roman empire.

The poems of Oſſian, tho' always held in the higheſt eſteem by thoſe who knew them, were allowed to remain in the obſcurity of their original Galic, till Mr Macpherſon, about 20 years ago, tranſlated a collection of them into Engliſh, which immediately attracted the attention of every perſon who had a true taſte for poetry. Dr Blair, in particular, introduced theſe poems into the world with thoſe critical remarks, which do no leſs honour ſo himſelf than to the poet. According to that eminent critic, the two great characteriſtics of Oſſian's poetry are tenderneſs and ſublimity. Oſſian is, perhaps, the only poet who never relaxes, or lets himſelf down into the light and amuſing ſtrain. He moves perpetually in the high region of the grand and pathetic. The events which he records are all ſerious and grave; the ſcenery wild and romantic. We find not in him an imagination that ſports itſelf and dreſſes out gay trifles to pleaſe the fancy. His poetry, more perhaps than that of any other, deſerves to be ſtyled the *poetry of the heart*. It is a heart penetrated with noble ſentiments, with ſublime and tender paſſions; a heart that glows and kindles the fancy; a heart that is full, and pours itſelf forth. Of all the great poets, Homer is the one whoſe manner and whoſe times come the neareſt to Oſſian's. Homer's ideas were more enlarged, and his characters more diverſified. Oſſian's ideas fewer, but of the kind fitteſt for poetry; the bravery and generoſity of heroes, the tenderneſs of lovers, and the attachment of friends. Homer is diffuſe; Oſſian abrupt and conciſe. His images are a blaze of lightning, which flaſh and vaniſh. Homer has more of impetuoſity and fire; Oſſian of a ſolemn and awful grandeur. In the pathetic, Homer has great power; but Oſſian exerts that power much oftener, and has the character of tenderneſs more deeply imprinted

‡ *Fingal*, B. iv.

* See *Galic Antiquities*.

† Poem of *Berrathon*.

* *Galic A tiquities*, poem of *Dermid*.

printed on his works. No poet knew better how to ſeize and melt the heart. With regard to dignity of ſentiment, we muſt be ſurpriſed to find that the pre-eminence muſt clearly be given to the Celtic bard. This appears nowhere more remarkable than in the ſentiments which he expreſſes towards his enemies. "U-"thal fell beneath my ſword, and the ſons of Berra-"thon fled.—It was then I ſaw him in his beauty, "and the tear hung in my eye. Thou art fallen, young "tree, I ſaid, with all thy beauty round thee. Thou "art fallen on thy plains, and the field is bare. The "winds come from the deſart, and there is no ſound "in thy leaves! Lovely art thou in death, ſon of car-"borne Larthmore *!" His ſuppoſition, that all the little feuds and differences of this life ſhould be forgot in a future ſtate, and that thoſe who had once been foes would "ſtretch their arms to the ſame ſhell in "Loda," gives us the higheſt idea of the man as well as of the poet. "Daughter of beauty, thou art low! "A ſtrange ſhore receives thy corſe. But the ghoſts "of Morven will open their halls, when they ſee thee "coming. Heroes around the feaſt of dim ſhells, in "the midſt of clouds, ſhall admire thee; and virgins "ſhall touch the harp of miſt †."——"The feuds of "other years by the mighty dead are forgotten. The "warriors now meet in peace, and ride together on "the tempeſt's wing. No clang of the ſhield, no noiſe "of the ſpear, is heard in their peaceful dwellings. "Side by ſide they ſit, who once mixed in battle their "ſteel. There, Lochlin and Morven meet at the mu-"tual feaſt, and liſten together to the ſong of their "bards ‡."

But the ſublimity of moral ſentiments, if they wanted the ſoftening of the tender, would be in hazard of giving a ſtiff air to poetry. It is not enough that we admire. Admiration is a cold feeling in compariſon of that deep intereſt the heart takes in tender and pathetic ſcenes. With ſcenes of this kind Oſſian abounds; and his high merit in theſe is inconteſtable. He may be blamed for drawing tears too often from our eyes; but that he has the power of commanding them, no man who has the leaſt ſenſibility can queſtion. His poems awake the tendereſt ſympathies, and inſpire the moſt generous emotions. No reader can riſe from him without being warmed with the ſentiments of humanity, virtue, and honour.

But the excellency of theſe poems occaſioned in many perſons a doubt of their authenticity. Their genuineneſs, however, has been very ably defended by Dr Blair and Lord Kames, and warmly ſupported by the author of the *Galic Antiquities*, who has given the public ſome more remains of Oſſian's poetry.

As the nature of our work will not allow us to treat this matter at full length, we ſhall only give a brief view of the arguments offered in ſupport of the authenticity of theſe poems, referring our readers to the authors juſt now mentioned for fuller ſatisfaction.

Theſe compoſitions, ſay they, have all the *internal* marks of antiquity ſo ſtrongly impreſſed upon them, that no reader of taſte and judgment can deny their claim to it. They exhibit ſo lively a picture of cuſtoms which have diſappeared for ages, as could be drawn only from nature and real life. The features are ſo diſtinct, that few portraits of the life continually paſſing before us are found to be drawn with ſo much likeneſs. The manners uniformly relate to a very early ſtage of ſociety; and no hint, no alluſion to the arts, cuſtoms, or manners, of a more advanced period, appears throughout the poems. To that diſtinction of ranks, which is always found in adult ſocieties, the poet appears to have been a perfect ſtranger. The firſt heroes prepare their own repaſts, and indiſcriminately condeſcend to the moſt menial ſervices. Their quarrels ariſe from cauſes generally ſlight, but in ſuch a period extremely natural. A rivalſhip in love, an omiſſion at a feaſt, or an affront at a tournament, are often the foundation of a quarrel among ſingle heroes. And the wars in which whole tribes are engaged, are carried on with a view, not to enlarge their territory, but to revenge perhaps the killing of a few deer on their mountains, or the taking forcibly away one of their women. Their occupation was war and hunting, and their chief ambition was to have their fame in the ſongs of the bards.

The notions of a future ſtate, exhibited in theſe poems, are likewiſe ſtrongly marked with the characters of antiquity. A creed ſo uncommon that the imagination of a modern could not be ſuppoſed to graſp ſo ſtrong an idea of it from mere fancy, is uniformly ſupported throughout. This creed is extremely ſimple, but admirably ſuited to the times.

The language too, and the ſtructure, of theſe poems, bear the moſt ſtriking characters of antiquity. The language is bold, animated, and metaphorical, ſuch as it is found to be in all infant-ſtates; where the words, as well as the ideas and objects, muſt be few; and where the language, like the imagination, is ſtrong and undiſciplined. No abſtract, and few general, terms appear in the poems of Oſſian. If objects are but introduced in a ſimile, they are always particularized. It is "the young pine of Iniſhuna;" it is "the bow of the ſhowery Lena." This character, ſo conſpicuous in the poems of Oſſian, is a ſtriking feature in the language of all early ſtates; whoſe objects and ideas are few and particular, and whoſe ordinary converſation is of courſe highly figurative and poetical. A picture, therefore, marked with ſuch ſtriking features, could not be drawn without an original.

The whole texture of the compoſition is alſo, like the language, bold, nervous, and conciſe; yet always plain and artleſs; without any thing of that modern refinement, or elaborate decoration, which attend the advancement of literature. No foreign ornaments are hunted after. The wild and grand nature which lay within the poet's view, is the only ſource from which he draws his ornaments. Beyond this circle, his imagination, though quick and rapid, ſeldom made any excurſion. We perceive his language always to be that of a perſon who ſaw and felt what he deſcribes; who bore a part in the expeditions which he celebrates, and who fought in the battles which he ſings.

In giving the *external* and more poſitive proofs of the authenticity of Oſſian's poems, it is obſerved,—That there have been in the Highlands of Scotland, for ſome ages back, a vaſt many poems aſcribed to Oſſian: That theſe poems have been held in the higheſt veneration, repeated by almoſt all perſons, and on all occaſions. Theſe are facts ſo well known, that nobody as yet has been hardy enough to deny them: There is not an old man in the Highlands, who will

---

[*] ſſian's rks, em of rathon.

[†] lic An-ties, m of thal.

[‡] A poem Dargo.

not declare, that he heard ſuch poems repeated by his father and grandfather, as pieces of the moſt remote antiquity, There is not a diſtrict in the Highlands where there are not many places, waters, iſles, caves, and mountains, which, from time immemorial, are called after the names of Oſſian's heroes.—There is not a lover of ancient tale or poetry, however illiterate, who is not well acquainted with almoſt every ſingle name, character, and incident, mentioned in thoſe tranſlations of Oſſian's poems, which he may have never heard of.—Bards, who are themſelves ſeveral centuries old, quote thoſe poems, imitate them, and refer to them.—The ordinary converſation and compariſons of the Highlanders frequently allude to the cuſtoms and characters mentioned in them;—and many of their moſt common proverbs, eſtabliſhed by the moſt ancient uſe, are lines borrowed from the poems of Oſſian [*].—The moſt ancient of the clans boaſt of deriving their pedigree, each from ſome one of Oſſian's heroes;—and many of the ſigns armorial aſſumed by them, are drawn from the feats aſcribed to their predeceſſors in thoſe poems [†].—Manuſcripts are mentioned, in which ſome of theſe have been preſerved for ſeveral centuries [‡]; and a liſt of living names, in different parts of the Highlands, is appealed to, as perſons who ſtill repeat a part of theſe poems [‖].—Whilſt Mr Macpherſon was engaged in the tranſlation, many reſpectable perſons, gentlemen and clergymen, avowed to the public, that theſe were Oſſian's poems, with which they had long been acquainted, and that the tranſlation was literal [§]. This appears alſo from the large ſpecimens of the originals publiſhed and compared by proper judges. The originals lay a conſiderable time in the hands of the bookſeller, for the inſpection of the curious; they have been afterwards ſhown frequently to many of the beſt judges, and offered for publication if the editior had been favoured with ſubſcriptions. In like manner, propoſals are now circulating for printing the originals of the ancient poems lately tranſlated by Mr Smith; a copy of which, in the event of ſubſcriptions not coming in, is depoſited with the Secretary to the *Highlaud Society* in London. It is likewiſe argued in ſupport of the authenticity of theſe poems, that candid ſceptics, on hearing ſome of them repeated by illiterate perſons, who had never ſeen the tranſlation, cauſed them to give the meaning of what they repeated, by an extempore tranſlation into Engliſh, and by this means had all their doubts of the authenticity of Oſſian removed [*]. They urge further, that ſuch paſſages of Oſſian's works as are ſtill repeated by ſome old men, are among the moſt beautiful parts of Oſſian's poems; ſuch as the battle of Lora, the moſt affecting parts of Carthon, Berrathon, the death of Oſcar, and Darthula, or the children of Uſnoth, &c.: which gives a credibility to his being equal to the other parts of the collection, none of it being ſuperior to theſe in merit.

To theſe, and the like arguments advanced in ſupport of the authenticity of the poems aſcribed to Oſſian, we find little objected by ſuch as are ſceptics on this head, except general aſſertions, That ſuch poems could not have been compoſed in ſo early a period;—that tradition could not preſerve them ſo long;—and the remains to be met with from oral recitation are now ſo inconſiderable.

To this it has been anſwered, That poetry has been cultivated with moſt ſucceſs in the earlieſt ſtages of ſociety; that in Greece, Orpheus, Linus, Heſiod, and Homer, wrote their admirable poems ſome ages before any thing had been written in proſe in the Greek language; that the book of Job, written in a very early period of ſociety, is highly poetical; that among the tribes of Lapland and America, there have been found, in the earlieſt ſtate, ſome excellent pieces of poetry. That the Caledonians in particular, had ſome peculiar inſtitutions, which tended to improve their poetry: their druids were among the moſt learned philoſophers which perhaps any age or country produced; their bards or poets were the diſciples of thoſe druids, and were always a ſtanding order, to which none but the moſt promiſing geniuſes were admitted. This ſtanding college of poets was furniſhed, not only with the fruits of their own long ſtudy and obſervation, but alſo with as much as merited to be preſerved of the compoſitions of their predeceſſors in office, ſince the "light of the ſong" firſt dawned. They had the advantage of one another's converſation; which would excite their emulation, and make them aſpire to eminence: They were always preſent, and generally engaged, in every grand operation that was tranſacted; which could not fail to inſpire their muſe with the trueſt poetic fire.

The caſe of Oſſian was particularly favourable. He lived in an age when manners came to a conſiderable degree of refinement under the care of the Bards and Druids. Poetry in his day was conſiderably advanced; and the language, though ſtrong and figurative, had undergone ſome degree of cultivation, and learned to flow in regular numbers, adapted to the harp, the favourite inſtrument of the times. As a prince and a warrior, his mind muſt have been expanded and much enlarged by his excurſions to other countries. At home he had Ullin, Alpin, Carril, and Ryno, to converſe with; all of them poets of eminence, who would have advantaged him greatly by their example and converſation. All theſe advantages, meeting with a native fire and enthuſiaſm of genius, as in the caſe of Oſſian, may well be ſuppoſed to have produced poems that might challenge the veneration of ages.

But it is not to their merit alone that we owe the preſervation of theſe poems ſo long by oral tradition. Other circumſtances concurred; of which, the inſtitution of the BARDS deſerves particular notice. In a country, the only one perhaps in the world in which there was always, from the earlieſt period almoſt to the preſent age, a ſtanding order of poets, we cannot reaſonably be ſurpriſed, either at finding excellent poems compoſed, or, after being compoſed, carefully preſerved from oblivion. A great part of the buſineſs of this order was to watch over the poems of Oſſian. In every family of diſtinction there was always one principal bard, and a number of diſciples, who vied with each other in having theſe poems in the greateſt perfection. Should the inſtitution of the bards laſt for ever, the poems of Oſſian could never periſh.

Nor were they only the bards of great families who took an intereſt in theſe poems: the vaſſal, equally fond of the ſong with his ſuperior, entertained himſelf in the ſame manner. This, with a life free from care, a ſpirit unbroken by labour, and a ſpace of time unoccupied by any other employment or diverſion, contributed to render the Highlanders a nation of

---

[*] See examples under each of theſe heads in the *Galic Antiquities*, p. 93, 94, 95.

[†] *Ibid.* p. 194. in *note.*

[‡] *Kames's Sketches*, B. i.

[‖] *Galic Antiquities*, p. 95. 128.

[§] See liſt of names, *Appendix* to Dr Blair's Diſſertation, *Oſſian's Works*, 2d edit.

[*] Pref. to Dr Percy's *Reliques of Old Engliſh Poetry*, 1ſt edit.

ſingers and poets. From ſuch a people, the ſuperior merit of Oſſian's poems would naturally procure every encouragement, which they always retained as long as the manners of the people remained unchanged.

Many other reaſons conſpired to preſerve the poems of Oſſian. The martial and intrepid ſpirit which they breathed, made it the intereſt of the chieftains to preſerve them: the ſtrain of juſtice, generoſity, and humanity, which runs through them, recommended them to the ſuperintendants of religion, who well knew how much the morals of a people muſt be tinctured with thoſe ſongs which they are continually repeating, and which have all the advantages of poetry and of muſic. In ſuperſtitious ages, the people revered theſe poems from their being addreſſed generally to ſome "ſon of "the rock," ſuppoſed to be the tutelar ſaint of the place, or the great Iriſh apoſtle St Patrick. Beſides, every hill and dale which the natives of the Highlands walked over, was claſſic ground. Every mountain, rock, and river, was immortalized in the ſong. This ſong would naturally be ſuggeſted by the ſight of theſe objects, and every body would hum it as he walked along. All the proverbs and cuſtoms to which theſe poems gave riſe, would operate in the ſame manner. The ſon would aſk what they meant, and the father would repeat the ſong from which they were taken. The diſtinct and unſubdued ſtate in which the Highlanders remained for ſo long a courſe of ages, every clan, one generation after another, inhabiting the ſame valley, till towards the preſent century, contributed much to preſerve their traditions and their poems; and the conſtant and general cuſtom of repeating theſe in the winter-nights, kept them always alive in their remembrance.

To theſe cauſes and cuſtoms the preſervation of Oſſian's poems, for ſo many ages, has been aſcribed. But theſe cauſes and cuſtoms have ceaſed to exiſt; and the poems of Oſſian, of courſe, have ceaſed to be repeated.—Within a century back, the Highlands of Scotland have undergone a greater revolution than it had done for ten before that period. With a quicker pace the feudal ſyſtem vaniſhed; property fluctuated; new laws and new cuſtoms ſtept in, and ſupplanted the old: and all this, with ſuch ſudden and ſuch violent convulſions, as may well account for the ſhaking of a fabric which had ſtood ſo many ages, that it ſeemed to have bidden defiance to all the injuries of time. Even ſince Mr Macpherſon gathered the poems in his collection, the amuſements, employments, and taſte of the Highlanders are much altered. A greater attention to commerce, agriculture, and paſturage, has quite engroſſed that partial attention which was paid, even then, to the ſong of the bard. In twenty years hence, if manners continue to change ſo faſt as they do at preſent, the fainteſt traces will ſcarce be found of thoſe tales and poems. "Oſſian himſelf is the laſt "of his race; and he too ſhall ſoon be no more, for "his grey branches are already ſtrewed on all the "winds."

Among the cauſes which make theſe poems vaniſh ſo rapidly, poverty and the iron rod ſhould come in for a large ſhare. From the baneful ſhade of thoſe *murderers of the muſe*, the light of the ſong muſt faſt retire. No other reaſon needs be given why the preſent Highlanders neglect ſo much the ſongs of their fathers.—Once, the humble, but happy vaſſal, ſat at his eaſe, at the foot of his grey rock or green tree. Few were his wants, and fewer ſtill his cares; for he beheld his herds ſporting around him, on his then unmeaſured mountain. He hummed the careleſs ſong, and tuned his harp with joy, while his ſoul in ſilence bleſſed his children.—Now, we were going to draw the compariſon:

> *——ſed Cynthius aurem*
> *Vellit et admonuit.*

It is more agreeable to remark, as another cauſe for the neglect of ancient poems and traditions, the growth of induſtry, which fills up all the blanks of time to more advantage, and eſpecially the increaſe of more uſeful knowledge.—But above all, the extinction of the order of the bards haſtened the cataſtrophe of Oſſian's poems. By a happy concidence Macpherſon overtook the very laſt that remained of this order, (Macvurich, bard to Clanronald), and got his treaſure. This fact (with the *red book* furniſhed by Mr Macdonald of Croidart, and ſome other MSS.) accounts for Mr Macpherſon's having found theſe poems in greater number and perfection than they could ever ſince be met with. The fragments, however, which have ſince been gathered, give a credibility to every thing that has been ſaid of the original grandeur of the building.

After giving this abſtract of the *arguments* urged for the authenticity of Oſſian's poems, and of the anſwers to objections ſtarted againſt them, we ſhall conclude with referring thoſe who wiſh to ſee the ſubject diſcuſſed on a different footing, namely, by an appeal to *facts*, to two pamphlets recently publiſhed, *Shaw's Inquiry*, and *Clark's Anſwer:* From the former of which, the authenticity of Oſſian's poems ſeemed to ſuſtain a very formidable attack; till the latter appeared, expoſed the impotence of the attempt, and ſhewed the unſhaken baſis on which the object of it reſted. So that now we ſeem authoriſed to conclude, without the imputation of partiality, that the controverſy is at laſt come to an end; and that the genuineneſs of the poems will be as univerſally eſtabliſhed in other nations, as the originals have been admired for ages in the Highlands.

OSSIFICATION, the formation of bones; but more particularly the converſion of parts naturally ſoft to the hardneſs and conſiſtence of bones.

OSSORY, the weſt diviſion of Queen's-county in Ireland.

Ossory (Bale biſhop of). See Bale.

OSTADE (Adrian Van), an eminent Dutch painter born at Lubec in 1610. He was a diſciple of Francis Hals, in whoſe ſchool Brouwer was cotemporary with him, where they contracted an intimate friendſhip. The ſubjects of his pencil were always of a low kind, he having nearly the ſame ideas as Teniers; diverting himſelf with clowns and drunkards in ſtables, alehouſes, and kitchens. His pictures are ſo tranſparent and highly finiſhed, that they have the poliſh and luſtre of enamel: they have frequently a force ſuperior to Teniers; yet it were to be wiſhed that he had not deſigned his figures ſo ſhort. He is perhaps one of the Dutch maſters who beſt underſtood the *chiaro obſcuro;* and he was often employed to paint figures for the beſt landſcape painters of his countrymen. He died in 1685.

1685. His works, eſpecially thoſe of his beſt time and manner, are very ſcarce; ſo that when they are to be purchaſed, no price is thought too much for them. His prints etched by himſelf, large and ſmall, conſiſt of 54 pieces.

OSSUNA, an ancient and conſiderable town of Andaluſia in Spain; with an univerſity, an hoſpital, and the title of a duchy. N. Lat. 37. 8. W. Long. 4. 18.

OSTALRIC, a town of Spain, in Catalonia. It had a ſtrong caſtle, but was taken by the French and demoliſhed in 1695. It is ſeated on the river Tordera, in E. Long. 2. 45. N. Lat. 24. 44.

OSTEND, a very ſtrong ſea-port town of the Netherlands, in Auſtrian Flanders, with a good harbour, and a magnificent town-houſe. It is not very large, but is very well fortified. This place was taken by the Dutch in 1706, but reſtored to the emperor in 1723; when an Eaſt India company was eſtabliſhed here, but entirely ſuppreſſed by treaty in 1731. It was taken by the French in Auguſt 1745, after ten days ſiege; but rendered back by the treaty of Aix la Chapelle. E. Long. 2. 48. N. Lat. 51. 17.

OSTEOCOLLA, in natural hiſtory, though ſuppoſed by many to be an earth, is truly a cruſtated kind of ſpar debaſed by earth, and therefore not tranſparent. It is uſually found coating over vegetables, or other bodies, in form of incruſtations; ſo that the true oſteocolla is a tubular cruſtaceous ſpar of a very foul and coarſe texture; and carries with it much more the appearance of a marl than of a ſpecies of ſpar. The maſſes of oſteocolla, though regularly of the ſame figure, are very different in ſize; ſome of them not being thicker than a crow quill, while others are five and ſix inches in diameter; it is always, however, of a tubular figure, and a wrinkled rough ſurface. Oſteocolla is frequent in Germany; where it is found buried near the ſurface of the earth, ſometimes in ſtrata of ſand, but more frequently among marls: it ſhould be choſen, for uſe, the pureſt that can be had, of a pale brown colour, and of a tolerably firm and cloſe texture.—It has long been famous for bringing on a callus in fractured bones; its name, *oſteocolla*, ſignifies "bone-glue," or the "bone-binder." It is alſo recommended as a diuretic, and as good in the fluor albus; but the preſent practice has rejected it.

OSTEOLOGY, that part of anatomy which treats of the bones. See ANATOMY, Part I.

OSTERVALD (John Frederick), a famous Proteſtant divine, was born at Neufchatel in 1663; and made ſuch rapid progreſs in his ſtudies, that he became maſter of arts at Saumur before he was 16 years of age. He afterwards ſtudied at Orleans and at Paris. At his return to Neufchatel in 1699, he became paſtor of the church there; and contracted a ſtrict friendſhip with the celebrated John Alphonſus Turretin of Geneva, and the illuſtrious Samuel Werenfels of Baſil. The union of theſe three divines, which was called the *Triumvirate of the divines of Swiſſerland*, laſted till his death. Mr Oſtervald acquired the higheſt reputation by his virtues, his zeal in inſtructing his diſciples, and reſtoring eccleſiaſtical diſcipline. He wrote many books in French; the principal of which are, 1. A Treatiſe concerning the Sources of Corruption; which is a good moral piece. 2. A Catechiſm, or Inſtruction in the Chriſtian Religion; which has been tranſlated into German, Dutch, and Engliſh; and the Abridgment of the Sacred Hiſtory, which he prefixed to it, was tranſlated and printed in Arabic, in order to be ſent to the Eaſt Indies, by the care of the Society for the propagation of the Goſpel: and that Society, eſtabliſhed in London, honoured him, by admitting him an honorary member. 3. A treatiſe againſt Impurity. 4. An edition of the French Bible of Geneva, with Arguments and Reflections, in folio. 5. *Ethica Chriſtiana*. 6. *Theologiæ Compendium*, &c. He died in 1747, regretted by all who knew him.

OSTIA, a town formerly of note, on the left or ſouth ſide and at the mouth of the Tiber, whence its name; the firſt Roman colony led by Ancus Martius, called *Colonia Oſtienſis*. At this day it lies in ruins, only retaining its name. There were ſalt-works there, called *Salinæ Oſtienſes*, as early as the times of Ancus Martius, (Livy); from which the *Via Salaria*, which led to the Sabines, took its name, (Varro). It gave name to one of the gates of Rome, which was called *Oſtienſis*, (Ammian).

OSTIACKS, a people of Siberia in Aſia, who inhabit the banks of the river Oby. See SIBERIA.

OSTRACION, in zoology, a genus of the amphibia nantes claſs. It has ten long cylindrical obtuſe teeth in each jaw; the aperture is linear; the body is covered with a bony ſubſtance, and it has no belly-fins. There are nine ſpecies; principally diſtinguiſhed by the angles of their bodies, and number of fins near their tail.

OSTRACISM, in Grecian antiquity, denotes the baniſhment of ſuch perſons whoſe merit and influence gave umbrage to the people of Athens, leſt they ſhould attempt any thing againſt the public liberty. This puniſhment was called *oſtraciſm*, from the Greek word οςρακον, which properly ſignifies a "ſhell;" but when applied to this object, it is uſed for the billet on which the Athenians wrote the names of the citizens whom they intended to baniſh. The learned are divided with regard to the ſubſtance of which this billet was formed: ſome inſiſt that it was a ſmall ſtone, or a piece of brick; ſome, that it was a piece of bark; and others aſſert, that it was a ſhell. The word admits moſt of theſe interpretations. But what determines its true ſenſe, is the epithet given it by ancient authors, of *ceramice maſtix;* which words ſignify, "The puniſhment of potter's clay:" and this expreſſion ſeems to us a proof, that the word οςρακον, when applied on this occaſion, ſignifies a "piece of baked earth, in the form of a ſhell;" and undoubtedly the Latin authors had this idea of the word here, for they tranſlated it by *teſtula*.

The ancients are likewiſe divided with regard to the time when oſtraciſm was inſtituted. But they all agree, that the perſon who moved the law, was its firſt victim. But as to the name of its patron, and the time of its eſtabliſhment, they differ extremely. Many are of opinion, that oſtraciſm owes its origin to very remote times.

However that be, the puniſhment of oſtraciſm was inflicted by the Athenians when their liberty was in danger. If, for inſtance, jealouſy or ambition had ſowed diſcord among the chiefs of the republic; and if different parties were formed, which threatened ſome revolution in the ſtate; the people aſſembled to propoſe meaſures proper to be taken in order to prevent the conſequences of a diviſion which in the end might be fatal to freedom. Oſtraciſm was the remedy to which they uſually had recourſe on theſe occaſions; and the conſultations of the people generally terminated with a decree, in which a day was fixed for a particular aſſembly, when they were to proceed to the ſentence of oſtraciſm. Then they who were threatened with baniſhment, omitted no aſſiduity or art which might gain them the favour of the people. They made harangues to evince their innocence, and the great injuſtice that would be done them if they were baniſhed. They ſolicited, in perſon, the intereſt of every citizen; all their party exerted themſelves in their behalf; they procured informers to vilify the chiefs of the oppoſite faction. Some time before the meeting of the aſſembly, a wooden incloſure was raiſed in the forum, with ten doors, *i. e.* with as many as there were tribes in the republic; and when the appointed day was come, the citizens of each tribe entered at their reſpective door, and threw into the middle of the incloſure the ſmall brick on which the citizen's name was written whoſe baniſhment they voted. The archons and the ſenate preſided at this aſſembly, and counted the billets. He who was condemned by 6000 of his fellow-citizens, was obliged to quit the city within ten days; for 6000 voices, at leaſt, were requiſite to baniſh an Athenian by oſtraciſm.

The Athenians, without doubt, foreſaw the inconveniences to which this law was ſubject; but they choſe rather, as Cornelius Nepos hath remarked, ſometimes to expoſe the innocent to an unjuſt cenſure, than to live in continual alarms. Yet as they were ſenſible that the injuſtice of confounding virtue and vice would have been too flagrant, they ſoftened, as much as they could, the rigour of oſtraciſm. It was not aggravated with the circumſtances which were moſt diſhonourable and ſhocking in the ordinary mode of exile. They did not confiſcate the goods of thoſe who were baniſhed by oſtraciſm. They enjoyed the produce of their effects in the places into which they were baniſhed; and they were baniſhed only for a certain time. But in the common baniſhment, the goods of the exiles were always confiſcated, and no hopes were given them of ever returning to Athens.

The ſcholiaſt of Ariſtophanes informs us of a third difference betwixt oſtraciſm and the common baniſhment. He ſays, that a particular place of retirement was aſſigned to thoſe who were baniſhed by oſtraciſm, which was not appointed to the other exiles. We ſuſpect, however, the truth of this obſervation; for Themiſtocles was certainly not limited in his baniſhment. That great man, as we are told by Thucydides, tho' his chief reſidence was at Argi, travelled over all the Peloponneſus.

This puniſhment, far from conveying the idea of infamy, became, at Athens, a proof of merit, by the objects on which it was inflicted; as Ariſtides the ſophiſt juſtly obſerves, in his ſecond declamation againſt the Gorgias of Plato, where he ſays, that oſtraciſm was not an effect of the vindictive ſpirit of the people againſt thoſe whom it condemned; that the law, whether good or bad (for he enters not into an examination of the queſtion), was only meant to prune the luxuriant growth of tranſcendent merit; that it condemned to an exile of ten years, only thoſe illuſtrious men who were accuſed of being exalted far above other citizens by their conſpicuous virtue; and that none of that public indignation was ſhewn to the exiles by oſtraciſm, which commonly breaks out againſt criminals.

Such were the mitigations with which this law was introduced among the Athenians: and by them we ſee that they were ſenſible of all the inconveniences to which it was ſubject. They were indeed too enlightened a people, not to foreſee the many inſtances of injuſtice which it might produce; that if in ſome reſpects it would be favourable to liberty, in others it would be its enemy, by condemning citizens without allowing them a previous defence, and by making a capricious and envious people arbiters of the fate of great men; that it might even become pernicious to the ſtate, by depriving it of its beſt ſubjects, and by rendering the adminiſtration of public affairs an odious employment to men of capital talents and virtue.

However great the inconveniences of Oſtraciſm were, it would not have been impoſſible to avoid them; and we may add, that this law would have been of ſervice to the ſtate, if the people by whom it was inſtituted had always had diſcernment enough only to give it force on ſuch occaſions as endangered liberty. But its fate was like that of almoſt all other laws which the wiſeſt legiſlators have planned for the good of communities. Deſtined by their inſtitution to maintain order, to repreſs injuſtice, and to protect innocence, men have found ways to pervert their application, and have made them inſtruments to gratify their private paſſions. Thus oſtraciſm was eſtabliſhed to prevent the dangerous enterpriſes of the great, and to preſerve the vigour of the democracy; but the people of Athens, naturally jealous and envious, exerted that law, to remove men of eminent merit from the ſtate, by whoſe preſence they were reproved and intimidated. The fear of tyranny was commonly but a ſpecious pretext with which they veiled their malignity. The repeated victories which they had gained over the Perſians, had rendered them, ſays Plutarch, proud and inſolent. Intoxicated with their proſperity, they arrogated all its glory to themſelves; they were jealous of thoſe citizens, whoſe political and military talents were the ſubjects of public eulogium. They thought the glory acquired by great men diminiſhed their own reputation. An Athenian no ſooner diſtinguiſhed himſelf by a ſplendid action, than he was marked out as a victim by public envy. His reputation was a ſufficient reaſon for his baniſhment.

OSTRACITES, in natural hiſtory, the name which authors have given the foſſile oyſter ſhell. Oſtracites has the ſame medical virtues with other abſorbent and calcareous earths.

OSTREA, the OYSTER, in zoology, a genus belonging to the order of vermes teſtacea. The ſhell has two unequal valves; the cardo has no teeth, but a ſmall hollowd it with tranſverſe lateral ſtreaks. There are 31 ſpecies, principally diſtinguiſhed by peculiarities in their ſhells. The common oyſter is reckoned an excellent food; and is eaten both raw, and variouſly prepared.

Oſtrea.

Britain has been noted for oyſters from the time of Juvenal, who, ſatyrizing an epicure, ſays,

> *Circæis nata forent, an*
> *Lucrinum ad Saxum, Rutupinove edita fundo,*
> *Oſtrea, callebat primo deprendere morſu.*
>
> He, whether Circe's rock his oyſters bore,
> Or Lucrine lake, or diſtant Richborough's ſhore
> Knew at firſt taſte.

The luxurious Romans were very fond of this fiſh, and had their layers or ſtews for oyſters as we have at preſent. Sergius Orata was the firſt inventor, as early as the time of L. Craſſus the orator. He did not make them for the ſake of indulging his appetite, but thro' avarice, and made great profits from them. Orata got great credit for his Lucrine oyſters; for, ſays Pliny, the Britiſh were not then known.

Pennant's Brit. Zool. vol. iv. p. 102.

The ancients eat them raw, and ſometimes roaſted. They had alſo a cuſtom of ſtewing them with mallows and docks, or with fiſh, and eſteemed them very nouriſhing.

Britain ſtill keeps its ſuperiority in oyſters over other countries. Moſt of our coaſts produce them naturally; and in ſuch places they are taken by dredging, and are become an article of commerce, both raw and pickled. The very ſhells, calcined, become an uſeful medicine as an abſorbent. In common with other ſhells, they prove an excellent manure.

Stews or layers of oyſters are formed in places which nature never allotted as habitations for them. Thoſe near Colcheſter have been long famous; at preſent there are others that at leaſt rival the former, near the mouth of the Thames. The oyſters, or their ſpats, are brought to convenient places, where they improve in taſte and ſize. It is an error to ſuppoſe, that the fine green obſerved in oyſters taken from artificial beds, is owing to copperas; it being notorious how deſtructive the ſubſtance or the ſolution of it is to all fiſh. We cannot give a better account of the cauſe, or of the whole treament of oyſters, than what is preſerved in the learned biſhop Sprat's hiſtory of the Royal Society, from p. 307, to 309.

"In the month of May, the oyſters caſt their ſpawn, (which the dredgers call their *ſpats*;) it is like to a drop of candle, and about the bigneſs of a halfpenny.

"The ſpat cleaves to ſtones, old oyſter-ſhells, pieces of wood, and ſuch like things, at the bottom of the ſea, which they call *cultch*.

"It is probably conjectured, that the ſpat in 24 hours begins to have a ſhell.

"In the month of May, the dredgers (by the law of the admiralty court) have liberty to catch all manner of oyſters, of what ſize ſoever.

"When they have taken them, with a knife they gently raiſe the ſmall brood from the cultch, and then they throw the cultch in again, to preſerve the ground for the future, unleſs they be ſo newly ſpat, that they cannot be ſafely ſevered from the cultch; in that caſe they are permitted to take the ſtone or ſhell, &c. that the ſpat is upon, one ſhell having many times 20 ſpats.

"After the month of May, it is felony to carry away the cultch, and puniſhable to take any other oyſters, unleſs it be thoſe of ſize, (that is to ſay) about the bigneſs of an half-crown piece, or when, the two ſhells being ſhut, a fair ſhilling will rattle between them.

Oſtrea || Oſtrich.

"The places where theſe oyſters are chiefly catched, are called the *Pent-Burnham*, *Malden*, and *Colne-waters*; the latter taking its name from the river of Colne, which paſſeth by Colne-Cheſter, gives the name to that town, and runs into a creek of the ſea, at a place called the *Hythe*, being the ſuburbs of the town.

"This brood and other oyſters, they carry to the creeks of the ſea, at Brickel-Sea, Merſy, Langno, Fingrego, Wivenho, Toleſbury, and Saltcoaſe, and there throw them into the channel, which they call their *beds* or *layers*, where they grow and fatten, and in two or three years the ſmalleſt brood will be oyſters of the ſize aforeſaid.

"Thoſe oyſters which they would have green, they put into pits about three feet deep in the ſalt-marſhes, which are overflowed only at ſpring-tides, to which they have ſluices, and let out the ſalt-water until it is about a foot and half deep.

"Theſe pits, from ſome quality in the ſoil co-operating with the heat of the ſun, will become green, and communicate their colour to the oyſters that are put into them in four or five days, tho' they commonly let them continue there ſix weeks or two months, in which time they will be of a dark green.

"To prove that the ſun operates in the greening, Toleſbury pits will green only in ſummer; but that the earth hath the greater power, Brickel-Sea pits green both winter and ſummer: and for a further proof, a pit within a foot of a greening-pit will not green; and thoſe that did green very well, will in time loſe their quality.

"The oyſters, when the tide comes in, lie with their hollow ſhell downwards; and when it goes out, they turn on the other ſide: they remove not from their place, unleſs in cold weather, to cover themſelves in the ouſe.

"The reaſon of the ſcarcity of oyſters, and conſequently of their dearneſs, is, becauſe they are of late years bought up by the Dutch.

"There are great penalties by the admiralty court, laid upon thoſe that fiſh out of thoſe grounds which the court appoints, or that deſtroy the cultch, or that take any oyſters that are not of ſize, or that do not tread under their feet, or throw upon the ſhore, a fiſh which they call a *five-finger*, reſembling a ſpur-rowel, becauſe that fiſh gets into the oyſters when they gape, and ſucks them out.

"The reaſon that ſuch a penalty is ſet upon any that ſhall deſtroy the cultch, is, becauſe they find that if that be taken away, the ouſe will increaſe, and the muſcles and cockles will breed there, and deſtroy the oyſters, they having not whereon to ſtick their ſpat.

"The oyſters are ſick after they have ſpat; but in June and July they begin to mend, and in Auguſt they are perfectly well: the male oyſter is black-ſick, having a black ſubſtance in the fin; the female white-ſick (as they term it), having a milky ſubſtance in the fin. They are ſalt in the pits, ſalter in the layers, but ſalteſt at ſea."

OSTRICH, in zoology. See Struthio.

OSTUNI, a town of Italy, in the kingdom of Naples, and in the Terra di Otranto, with a biſhop's ſee. Its territory is well cultivated, and abounds with olives and almonds. It is ſeated on a mountain near the gulph of Venice, in E. Long. 17. 49. N. Lat. 49. 59.

OSWEGO, a fort of North America, ſeated on the ſouth ſide of the lake Ontario, in W. Long. 70. 35. N. Lat. 45. 15.

OSWEIZEN, a town of Poland, in the Palatinate of Cracovia, with the title of a duchy. It carries on a great trade in ſalt, and is ſeated on the river Viſtula. E. Long. 19. 47. N. Lat. 50. 1.

OTACOUSTIC INSTRUMENT, or *Auricular Tube*, an inſtrument to facilitate the hearing. See ACOUSTICS, n° 26.

OTAHEITEE, a celebrated iſland of the South Sea, ſituated in W. Long. 149. 13. S. Lat. 17. 46. It was diſcovered by Captain Wallis in 1767; afterwards Mr Bougainville touched here, and it was viſited by Captain Cook in 1773 and 1774.

1 Appearance of the country.

The iſland conſiſts of two diſtinct kingdoms, which are united by a narrow neck of land; the larger being called by the natives *Tiarrabou*, or *O-Taheitee-Nue*; the ſmaller one, *Opoureonou*, or *O-Taheitee-Ete*. The circumference of both iſlands is about 40 leagues; the larger kingdom being divided into 43 diſtricts. The country has a delightful romantic appearance. The coaſt viewed from the ſea, preſents a moſt beautiful proſpect, being elevated like an amphitheatre. The iſland is ſkirted with a reef of rocks, and towards the ſea is level, being covered with fruit-trees of various kinds, particularly the cocoa-nut. At the diſtance of about three miles from the ſhore, the country riſes into lofty hills that are covered with wood, and terminate in peaks, from which large rivers are precipitated into the ſea. The ſtones every where appear to have been burnt, not one being found which did not give manifeſt ſigns of fire; ſo that there is great reaſon for ſuppoſing, that this and the neighbouring iſlands are either the ſhattered remains of a continent, or were torn from rocks, which from the creation of the world have been the bed of the ſea, and thrown up in heaps to a height which the waters never reach. What is further extraordinary, the water does not gradually grow ſhallow as we approach the ſhore, but is of immenſe depth cloſe by the land; and the iſlands in this neighbourhood are almoſt every where ſurrounded by reefs, which appear to be rude and broken in the manner that ſome violent concuſſion would naturally leave the ſolid ſubſtance of the earth; and Mr Forſter ſaw a rock with projecting longitudinal angles of black compact baſaltes. The exterior ranges of hills are ſometimes entirely barren, and contain a great quantity of yellowiſh clay, mixed with iron ochre; but others are covered with mould and wood like the mountains in the internal parts of the country. Pieces of quartz are ſometimes met with here; but no indications of precious minerals or metals of any kind have been obſerved, iron only excepted.

2 Climate.

The air is extremely healthy and pleaſant; the heat is not troubleſome; and freſh meat will keep very well for two days, and fiſh one day. The winds do not blow conſtantly from the eaſt, but generally a little breeze from eaſt to ſouth-ſouth eaſt. The tide riſes very little; and, being governed by the winds, is very uncertain. "The climate," ſays Mr Bougainville, "is ſo healthy, that notwithſtanding the hard labour of the ſhips companies while on ſhore, though the men were continually in the water, and expoſed to the meridian ſun, though they ſlept upon the bare ſoil, and in the open air, none of them fell ſick; thoſe who were afflicted with the ſcurvy, and were ſent on ſhore, regained their ſtrength: although they were obliged to aſſiſt in the erecting of a fort, and had ſcarce one uninterrupted night, yet they were ſo far recovered in the ſhort ſpace of time they continued there, that they were afterwards perfectly cured on board."

3 High mountains.

Notwithſtanding the great height of the inland mountains of Otaheitee, none of their rocks have the appearance of barrenneſs, every one of them being covered with woods. "We hardly believed our eyes," ſays M. de Bougainville, "when we ſaw a peak covered with woods up to its higheſt ſummit, which riſes above the level of the mountains in the anterior parts of the ſouthern quarter of this iſland. Its apparent ſize ſeemed to be more than 30 toiſes in diameter, and grew leſs in breadth as it roſe higher. At a diſtance it might have been taken for a pyramid of immenſe height, which the hand of an able ſculptor had adorned with garlands and foliage." One of the mates of the dolphin, with a party of marines and ſeamen, penetrated into the interior parts of the iſland; and having aſcended, with great difficulty, a mountain which they ſuppoſed to be a mile high, they diſcovered mountains before them ſo much higher, that with reſpect to them they ſeemed to be in a valley: towards the ſea the view was enchanting, the ſides of the hills were beautifully clothed with wood, villages were every where interſperſed, and the valleys between them afforded a ſtill richer proſpect; the houſes ſtood thicker, and the verdure was more luxuriant; and Mr Forſter, with other gentlemen, aſcended to the ſummit of one of the higheſt mountains in the iſland, from whence they had a proſpect of the iſland of Huahine, and ſome others lying at the diſtance of 40 leagues; from which we may form ſome judgment of the prodigious height of that mountain. The view of the fertile plain below them, and of a river making innumerable meanders, was delightful in the higheſt degree. The vegetation on the upper part of the mountains was luxuriant, and the woods conſiſted of many unknown ſorts of trees and plants.

4 Soil and produce.

The ſoil of this iſland is a rich fat earth, of a blackiſh colour. It produces ſpontaneouſly, or with the ſlighteſt culture imaginable, a great variety of the moſt excellent fruits; ſuch as bread-fruit, cocoa nuts, bananas of 13 ſorts, plantains, potatoes, yams, a fruit known here by the name of *jambu*, and reckoned moſt delicious; ſugar-canes, which the inhabitants eat raw; ginger; turmeric; a root of the ſalep kind, called by the inhabitants *pea*; a plant called *ethee*, of which the root only is eaten; a fruit that grows in a pod like that of a large kidney-bean, by the natives called *ahee*; a tree called *wharra*, which produces fruit ſomething like the pine-apple, and which is known in the Eaſt Indies by the name of *pandanes*; a ſhrub called *nono*; the *morinda*, which alſo produces fruit; a ſpecies of fern; a plant called *theve*; and the Chineſe paper-mulberry, of the bark of which they make their cloth;

an herb which the inhabitants eat raw, its flavour ſomewhat reſembling that of the Weſt India ſpinage called *calletoon*, but its leaf very different; a plant which the natives call *ava* or *eava*, from the root of which they expreſs a liquor, which, if drank to exceſs, intoxicates like wine or diſtilled ſpirits. Here are a ſort of ſhady trees covered with a dark-green foliage, bearing golden-coloured apples, which, in juicineſs and flavour, reſemble the ananas or pine-apple. One of the moſt beautiful trees in the world received here the name of *Barringtonia;* it had a great abundance of flowers larger than lilies, and perfectly white, excepting the tips of their numerous chives, which were of a deep crimſon. Such a quantity of theſe flowers were ſeen dropped off, that the ground underneath the tree was entirely covered with them. The natives called the tree *buddov;* and ſaid, that the fruit, which is a large nut, when bruiſed and mixed up with ſome ſhell-fiſh, and thrown into the ſea, intoxicates the fiſh for ſome time, ſo that they come to the ſurface of the water, and ſuffer themſelves to be taken with people's hands. Several other maritime plants in tropical climates are found to have the ſame quality. Mr Dalrymple deſcribes the method of catching fiſh with theſe plants as follows: The plant is thruſt under the coral rocks or hollows where the fiſh haunt; the effect is moſt ſenſible in ſtill water, though it is effectual in the open ſea; for the ſame gentleman ſays, he has ſeen fiſh ſoon after float on the ſurface of the water half dead, and ſome totally without life; and where the effect is leſs violent, the fiſh will be ſeen under the water to have loſt their poiſe, without coming up to the ſurface. Fiſh caught in this manner are not in the leaſt noxious or ill taſted.

5 Animals. In this iſland they have domeſtic poultry exactly reſembling thoſe of Europe: beſides which there are wild ducks; alſo beautiful green turtle-doves; large pigeons of a deep blue plumage and excellent taſte; a ſmall ſort of paroquets, very ſingular on account of the various mixture of red and blue in their feathers; alſo another ſort of a greeniſh colour, with a few red pots; the latter are frequently tamed, and are valued on account of their red feathers. Here is a kingfiſher of a dark green, with a collar of the ſame hue round his white throat; a large cuckoo, and a blue heron. Small birds of various kinds dwell in the ſhady trees; and, contrary to the generally received opinion that birds in warm climates are not remarkable for their ſong, have a very agreeable note. There were no quadrupeds but dogs, hogs, and rats; and for theſe laſt the natives were ſaid to have a ſcrupulous regard, inſomuch that they would by no means kill them; however, Capt. Cook, in 1773, turned about 14 cats on the iſland, which have probably reduced the number of theſe vermin. No frogs, toads, ſcorpions, centipedes, or any kind of ſerpent, have been found here: the ants, however, are troubleſome, but not very numerous. When the Endeavour firſt arrived here in 1679, the flies were found exceſſively troubleſome; but muſquetto nets and fly-flaps in ſome meaſure removed the inconvenience. Sydney Parkinſon, in his journal, ſays, that notwithſtanding theſe flies are ſo great a nuiſance, the natives, from a religious principle, will not kill them. But there is a ſtrange diſagreement in the accounts of different voyagers concerning this matter. For Mr Bougainville ſays, "this iſland is not infeſted by thoſe myriads of troubleſome inſects that are the plague of other tropical countries." And Mr Forſter ſays, "not a gnat or muſquetto hummed unpleaſantly about us, or made us apprehenſive of its bite." This inconvenience muſt therefore be felt at certain ſeaſons of the year, and in certain diſtricts of the country, more ſenſibly than at other times and places. There is great variety of excellent fiſh; and, according to Aitourou, a native who embarked with M. de Bougainville, there are ſea-ſnakes on the ſhore of Otaheitee, whoſe bite is mortal.

6 Deſcription of the inhabitants, &c. The inhabitants of Otaheitee are a ſtout, well-made, active, and comely people. The ſtature of the men, in general, is from five feet ſeven to five feet ten inches; the talleſt man ſeen by Captain Wallis meaſured ſix feet three inches and an half; and Captain Cook, in his ſecond voyage, deſcribes O-Too, the king of Otaheitee, to be of that height. "In order to paint "an Hercules or a Mars," ſays M. de Bougainville, "one could nowhere find ſuch beautiful models." They are of a pale brown complexion; in general their hair is black, and finely frizzled; they have black eyes, flat noſes, large mouths, and fine white teeth; the men wear their beards in many faſhions, all of them plucking out a great part, and have prominent bellies. Moſt of them ſmell ſtrong of the cocoa-nut oil. The women, in general, are much ſmaller, eſpecially thoſe of the lower rank or tawtows, which is attributed to their early and promiſcuous intercourſe with the men; whilſt the better ſort, who do not gratify their paſſions in the ſame unbridled manner, are above the middle ſtature of Europeans. Their ſkin is moſt delicately ſmooth and ſoft; they have no colour in their cheeks; their noſe is generally ſomewhat flat, but their eyes are full of expreſſion, and their teeth beautifully even and white. "The women," ſays M. de Bougainville, "have features not leſs agreeable than the generality of Europeans, and a ſymmetry of body and beautiful proportion of limbs which might vie with any of them." The complexion of the men is tawny; but thoſe who go upon the water are much more red than thoſe who live on ſhore. Some have their hair brown, red, or flaxen, in which they are exceptions to all the natives of Aſia, Africa, and America, who have their hair black univerſally; here, in the children of both ſexes, it is generally flaxen. The ſtrongeſt expreſſion is painted in the countenances of theſe people; their walk is graceful, and all their motions are performed with great vigour and eaſe. "I never beheld ſtatelier men," ſays Sydney Parkinſon. "The men of conſequence on the iſland wear the nails of their fingers long, which they conſider as a very honourable badge of diſtinction, ſince only ſuch people as have no occaſion to work can ſuffer them to grow to that length. This cuſtom they have in common with the Chineſe; but the nail of the middle finger on the right hand is always kept ſhort, the meaning for which peculiarity could not be learned. Only one ſingle cripple was met with among them, and he appeared to have been maimed by a fall. The women always cut their hair ſhort round their heads. Both ſexes have a cuſtom of ſtaining their bodies, which they call *tattowing;* both men and women have the hinder part of their thighs and loins marked very thick with black

lines in various forms; theſe marks are made by ſtriking the teeth of an inſtrument ſomewhat like a comb juſt through the ſkin, and rubbing into the punctures a kind of paſte made of ſoot and oil, which leaves an indelible ſtain. The boys and girls under twelve years of age are not marked; a few of the men, whoſe legs were marked in chequers by the ſame method, appeared to be perſons of ſuperior rank and authority. Mr Banks ſaw the operation of tattowing performed upon the backſide of a girl about thirteen years old. The inſtrument uſed upon this occaſion had thirty teeth; and every ſtroke, of which at leaſt a hundred were made in a minute, drew an ichor or ſerum a little tinged with blood. The girl bore it with moſt ſtoical reſolution for about a quarter of an hour; but the pain of ſo many hundred punctures as ſhe had received in that time, then became intolerable. She firſt complained in murmurs, then wept, and at laſt burſt into loud lamentations, earneſtly imploring the operator to deſiſt. He was, however, inexorable; and when ſhe began to ſtruggle, ſhe was held down by two women, who ſometimes ſoothed and ſometimes chid her; and now and then when ſhe was moſt unruly, gave her a ſmart blow. Mr Banks ſtaid in a neighbouring houſe an hour, and the operation was not over when he went away; yet it was performed but upon one ſide, the other having been done ſome time before; and the arches upon the loins, in which they moſt pride themſelves, and which give more pain than all the reſt, were ſtill to be done. Both men and women are not only decently but gracefully cloathed, in a kind of white cloth that is made of the bark of a ſhrub, and very much reſembles coarſe China paper. Their dreſs conſiſts of two pieces of this cloth; one of them, having a hole made in the middle to put the head through, hangs down from the ſhoulders to the mid-leg before and behind; another piece, which is between four and five yards long, and about one yard broad, they wrap round the body in a very eaſy manner: This cloth is not woven; but is made like paper, of the macerated fibres of the inner bark ſpread out and beaten together. Their ornaments are feathers, flowers, pieces of ſhell, and pearls; the pearls are worn chiefly by the women. In wet weather they wear matting of different kinds, as their cloth will not bear wetting. The dreſs of the better ſort of women conſiſts of three or four pieces: one piece, about two yards wide and eleven long, they wrap ſeveral times round their waiſt, ſo as to hang down like a petticoat as low as the middle of the leg; and this they call *parou*. This ſimple drapery affords the ſex an opportunity of diſplaying an elegant figure to the greateſt advantage, according to the talents and taſte of the wearer: no general faſhions force them to disfigure inſtead of adorning themſelves, but an innate gracefulneſs is the companion of ſimplicity. To this cloth they give a very ſtrong perfume.

7 Of their houſes.

The chief uſe which they make of their houſes is to ſleep in them; for unleſs it rains, they eat in the open air under the ſhade of a tree. Theſe houſes are no other than ſheds, all built in the wood between the ſea and the mountains: they are erected on an oblong ſquare; their width is nearly half of their length; they are nothing more than a roof, not quite four feet from the ground, raiſed on three rows of pillars, one row on each ſide, and one in the middle. The roof reſembles our thatched houſes in England, and conſiſts of two flat ſides inclining to each other. Their thatch conſiſts of palm-leaves. The floor of their dwelling is covered with hay, over which they ſpread mats. Some of theſe erections are furniſhed with a ſtool, which is appropriated ſolely to the uſe of the maſter of the family: they conſiſt of no other furniture except a few blocks of wood, which being ſquare, one ſide is hollowed into a curve; and theſe they uſe as pillows, and with their apparel they cover themſelves. In theſe open dwellings the whole family repoſe themſelves at night. The ſize of the houſe is proportioned to the number that conſtitutes the family. The eſtabliſhed order in theſe dormitories is, for the maſter and his wife to ſleep in the middle; round them the married people; in the next circle the unmarried women; and in the next, at the ſame diſtance, the unmarried men; and the ſervants at the extremity of the ſhed; but in fair weather, the latter ſleep in the open air. Some few dwellings, however, conſtructed for greater privacy, are entirely incloſed with walls of reeds, connected together with tranſverſe pieces of wood, ſo as to appear ſomewhat like large bird-cages cloſely lined; in theſe houſes there is commonly a hole left for the entrance, which can be cloſed up with a board.

Their candles are made of the kernels of a kind of oily nut, which they ſtick one above another on a ſkewer that is thruſt through the middle of them; the upper one being lighted burns to the ſecond, at the ſame time conſuming that part of the ſkewer that goes through it; the ſecond taking fire burns in the ſame manner down to the third, and ſo to the laſt; they burn a conſiderable time, and afford a pretty good light. The natives generally retire to reſt about an hour after it is dark.

8 Food, method of cookery, &c.

The food of the common people entirely conſiſts of vegetables. Theſe are, the bread-fruit, with bananas, plantains, yams, apples, and a ſour fruit, which, though not pleaſant by itſelf, gives an agreeable reliſh to roaſted bread-fruit, with which it is frequently beaten up. See the article BREAD-*Tree*. The fleſh, which is reſerved for the tables of the great, is either poultry, hogs, or dogs; the fleſh of their fowls is not well taſted, but that of dogs is eſteemed by the natives beyond pork. The ſmaller fiſh are generally eaten raw, as we eat oyſters: every thing that can be procured from the ſea is made an article of their food; for they will eat not only ſea-inſects, but what the ſeamen call *blubbers*, though ſome of them are ſo tough that they are obliged to ſuffer them to become putrid before they can be chewed. A very large ſhark being caught by the Dolphin's people was given to the natives; who ſoon cut it to pieces, and carried it away with great ſatisfaction.

They kill the animals they intend for food by ſuffocating them, which is done by ſtopping the mouth and noſe with their hands; they then ſinge off the hair, by holding the animal over a fire, and ſcraping him with a ſhell: with this inſtrument they cut him up, and take out the entrails; which are waſhed, and put into cocoa-nut ſhells, together with the blood. Dogs are eaten that are fed wholly upon bread-fruit, cocoa-nuts, yams, and other vegetables, and are never ſuffered to taſte any animal food; and thoſe who have taſted the fleſh of a dog thus fed, have declared it to be little inferior to Engliſh lamb. In order to dreſs their food, they kindle a fire, by rubbing the end of one piece of dry wood upon the ſide of another, in the manner as a carpenter with us whets a chiſel. They then dig a pit about half a foot deep, and two or three yards in circumference; they pave the bottom with large pebble ſtones, which they lay down very ſmooth and even, and then kindle a fire in it with dry wood, leaves, and the huſks of cocoa-nuts. When the ſtones are ſufficiently heated, they take out the embers, and rake up the aſhes on every ſide; they then cover the ſtones with a layer of green cocoa-nut leaves, and wrap up the animal that is to be dreſſed in the leaves of the plantain. If it is a ſmall hog, they wrap it up whole; if a large one, they ſplit it. When it is placed in the pit, they cover it with the hot embers, and lay upon them bread-fruit and yams, which are alſo wrapped up in the leaves of plantain. Over theſe they ſpread the remainder of the embers, mixing among them ſome of the hot ſtones, with more cocoa-nut-tree leaves upon them, and then cloſe up all with earth, ſo that the heat is kept in; the oven is kept thus cloſed a longer or ſhorter time, according to the ſize of the meat that is dreſſed. The meat, when taken out, is ſaid to be better dreſſed than any other way. They uſe ſhells for knives; and carve very dexterouſly with them, always cutting from themſelves. One of the principal attendants on Oberea, attempting the uſe of the knife and fork, could not feed himſelf therewith; but, by the mere force of habit, his hand came to his mouth, and the victuals at the end of his fork went way to his ear.

They are quite unacquainted with the method of boiling water, as they have no veſſels among them that will bear the fire. Whilſt the noble Oberea was one morning at breakfaſt with captain Wallis on board the Dolphin, the ſurgeon filled the tea-pot by turning the cock of a vaſe that ſtood upon the table. One of the lady's attendants obſerved this practice very attentively, and ſoon after turning the cock himſelf, received the water upon his hand; he no ſooner felt himſelf ſcalded, than he roared and danced about in an extravagant manner. The other Indians, unappriſed of the cauſe of theſe emotions, ſtood gazing at him in amazement, and not without ſome mixture of terror: but the gentlemen in company, who ſoon perceived the cauſe of the outcry, diſpelled the apprehenſions of their viſitants; and ſome ointment being applied to the ſcald, good-humour and confidence were again reſtored. The gunner of the ſhip, who was appointed comptroller of the market which was eſtabliſhed on ſhore with the natives, uſed to dine on the ſpot; the aſtoniſhment of theſe people was very great to ſee him dreſs his pork and poultry in a pot; at length an old man, who was extremely ſerviceable in bringing down proviſions to be exchanged, was put into poſſeſſion of an iron pot, and from that time he and his friends ate boiled meat every day. Several iron pots were likewiſe given to Oberea and ſome of the chiefs; which were in conſtant uſe, and drew every body to ſee them; but although the particulars of two ſucceſſive voyages of captain Cook to this iſland are circumſtantially related, we hear no more of this improvement in the culinary art, or of the further aſſiſtance which has been rendered thoſe people in ſupplying them with pots for boiling; but however deſirous the natives might be to eat boild meat, it was not adviſable to have ſuch an article of barter as iron kettles, when a few ſpike nails, or a common hatchet, would procure one of their largeſt hogs.

Salt water is the uſual ſauce to their food; thoſe who live near the ſea have it furniſhed as it is wanted, others at a diſtance keep it in large bamboos. The kernels of the cocoa-nuts furniſh them with another ſauce: theſe, made into a paſte ſomething of the conſiſtence of butter, are beat up with ſalt water, which has a very ſtrong flavour; but though at firſt it ſeemed very nauſeous, yet when the taſte became familiar, it was much reliſhed.

Their general drink is water, or the milk of the cocoa-nut. They ſhewed in general an averſion to ſtrong liquors; and whenever any one of them happened to drink ſo freely with any of the ſhip's company as to be intoxicated, he reſolutely refuſed to taſte any thing that was likely to produce the ſame effect again; but they have a plant which they call *ava ava*, from the root of which they procure a liquor which has an inebriating quality. Their manner of preparing this ſtrong drink is as ſimple as it is diſguſting to an European. Several of the people take ſome of the root, and chew it till it is ſoft and pulpy; they then ſpit it out into a platter or other veſſel, every one into the ſame: into this general receptacle water is poured according to the quantity prepared. The juice thus diluted, is ſtrained through ſome fibrous ſtuff like fine ſhavings, after which it is fit for drinking, and it is always prepared for preſent uſe: it has a pepperiſh taſte; drinks flat, and rather inſipid; and though it intoxicates, yet captain Cook ſaw but one inſtance where it had that effect, as the natives generally drink it with great moderation, and but little at a time. Sometimes they chew this root as Europeans do tobacco, and ſometimes they will eat it wholly.

They eat alone, or at leaſt only in company with a gueſt that happens to call in; and the men and women never ſit down together to a meal: the ſhade of a ſpreading tree ſerves them for a parlour; broad leaves ſpread in great abundance ſerve for a table-cloth; and if a perſon of rank, he is attended by a number of ſervants who ſeat themſelves round him; before he begins his meal, he waſhes his mouth and hands very clean, and repeats this ſeveral times whilſt he is eating. The quantity of food which theſe people eat at a meal is prodigious. Captain Cook ſays, he has ſeen one man devour two or three fiſhes as big as a pearch; three bread-fruits, each bigger than two fiſts; 14 or 15 plantains, or bananas, each ſix or ſeven inches long and four or five round, and near a quart of the pounded bread-fruit. Men of rank are conſtantly fed by their women; and one of the chiefs who dined on board the ſhips in 1769, ſhewed ſuch reluctance to feed himſelf, that one of the ſervants was obliged to feed him to prevent his returning without his meal. In one of the excurſions which the gentlemen of the ſhips made into the country in 1773, they arrived at a neat houſe, where a very fat man, who ſeemed to be a chief of the diſtrict, was lolling on his wooden pillow; before him two ſervants were preparing his deſert, by beating up with water ſome bread-fruit and bananas in a large wooden bowl, and mixing with it a quantity of fermented four paſte called *mahie*. While this was doing, a woman who ſat down near him, crammed down his throat by handfuls the remains of a large baked fiſh, and ſeveral bread-fruits, which he ſwallowed with a voracious appetite; his countenance was the picture of phlegmatic inſenſibility, and ſeemed to teſtify that all his thoughts centered in the gratification of his appetite. He ſcarce deigned to look at the ſtrangers; and a few monoſyllables which he uttered, were extorted from him to remind his feeders of their duty, when by gazing at them they grew leſs attentive to him.

That theſe people, who are remarkably fond of ſociety, and particularly that of their women, ſhould exclude its pleaſures from the table, where, among all other nations, whether civil or ſavage, they have been principally enjoyed, is truly inexplicable. How a meal, which every where elſe brings families and friends together, comes to ſeparate them here, was a ſingularity much inquired about, but never accounted for. "They ate alone," they ſaid, "becauſe it was right;" but why it was right to eat alone, they never attempted to explain. Such, however, was the force of habit in this inſtance, as it is in every other, that they expreſſed the ſtrongeſt diſlike, and even diſguſt, at their viſitants eating in ſociety, eſpecially with women, and of the ſame victuals. "At firſt (ſays captain Cook) we thought this ſtrange ſingularity aroſe from ſome ſuperſtitious opinion; but they conſtantly affirmed the contrary. We obſerved alſo ſome caprices in the cuſtom, for which we could as little account as the cuſtom itſelf. We could never prevail with any of the women to partake of the victuals at our table, when we were dining in company; yet they would go five or ſix together into the ſervants apartments, and there eat very heartily of whatever they could find: nor were they in the leaſt diſconcerted if we came in while they were doing it. When any of us have been alone with a woman, ſhe has ſometimes eaten in our company; but then ſhe has expreſſed the great unwillingneſs that it ſhould be known, and always extorted the ſtrongeſt promiſes of ſecrecy. Among themſelves, even two brothers and two ſiſters have each their ſeparate baſkets of proviſions, and the apparatus of their meal. When they firſt viſited us at our tents, each brought his baſket with him; and when we ſat down to table, they would go out, ſit down upon the ground, at two or three yards diſtance from each other, and turning their faces different ways take their repaſt without exchanging a ſingle word. The women not only abſtain from eating with the men, and of the ſame victuals, but even have their victuals ſeparately prepared by boys kept for that purpoſe, who depoſit it in a ſeparate ſhed, and attend them with it at their meals. But though they would not eat with us, or with each other, they have often aſked us to eat with them, when we have viſited thoſe with whom we were particularly acquainted at their houſes; and we have often upon ſuch occaſions eaten out of the ſame baſket, and drank out of the ſame cup. The elder women, however, always appeared offended at this liberty; and if we happened to touch their victuals, or even the baſket that contained it, they would throw it away."

After meals, and in the heat of the day, the middle-aged people of the better ſort generally ſleep. They are indeed extremely indolent; and ſleeping and eating are almoſt all that they do. Thoſe that are older are leſs drowſy, and the boys and girls are kept awake by the natural activity and ſprightlineſs of their age.

9 Diſeaſes. Theſe iſlanders, who inhabit huts expoſed to all the winds, and hardly cover the earth, which ſerves them for a bed, with a layer of leaves, are remarkably healthy and vigorous, and live to an old age without enduring any of its infirmities; their ſenſes are acute, and they retain their beautiful teeth to the laſt. M. de Bougainville deſcribes an old man, whom they ſaw on their landing, who had no other character of old age, than that reſpectable one which is imprinted on a fine figure. His head was adorned with white hair, and a long white beard; all his body was nervous and fleſhy; he had neither wrinkles, nor ſhewed any others tokens of decrepitude. This venerable man ſeemed diſpleaſed at the arrival of theſe ſtrangers; he even retired without making any returns to the courteſies they paid to him; but he gave no ſigns either of fear, aſtoniſhment, or curioſity: very far from taking any part in the raptures which the multitude expreſſed, his thoughtful and ſuſpicious air ſeemed to indicate, that he feared the arrival of a new race of men would interrupt the happineſs he had ſo long enjoyed. From whence it may be inferred, that his mind was not a whit more impaired than his body. There are, however, ſeveral ſorts of leprous complaints on this iſland, which appear in cutaneous eruptions of the ſcaly kind; ſome were ſeen that had ulcers upon different parts of their bodies: yet they ſeemed little regarded by thoſe who were afflicted with them, and no application whatever was uſed to them, not ſo much as to keep off the flies. But inſtances of them are rare, as the excellency of their climate, and the ſimplicity of their vegetable food, prevent almoſt all dangerous and deadly diſorders. They are ſometimes afflicted with the cholic, and coughs are not unknown among them; and the chiefs, who fare more ſumptuouſly, as a puniſhment for their voluptuouſneſs are ſometimes attacked with a diſorder ſimilar to the gout, in which the legs are ſwelled and exceſſively painful. M. de Bougainville's ſurgeon aſſured him, that he had ſeen many with marks of the ſmall-pox.

The uſual method employed here to reſtore the ſick to health, is by pronouncing a ſet form of words; after which the exorciſt applies the leaves of the cocoa-tree plaited, to the fingers and toes of the ſick; ſo that nature is left to conflict with the diſeaſe, without being aſſiſted with any ſalutary application of art. But tho' they ſeem utterly deſtitute of medical knowledge, they appear to be no inconſiderable proficients in ſurgery, which they had an opportunity of proving while the Dolphin lay here. One of the ſeamen, when on ſhore, ran a large ſplinter into his foot; and the ſurgeon not being at hand, one of his comrades endeavoured to take it out with a pen-knife; but after putting the poor fellow to a great deal of pain, he was obliged to give it over: an old native, who had been very active and ſucceſsful in eſtabliſhing a good underſtanding between the ſhip's company and his countrymen, happening to be preſent, called a man from the other ſide of the river, who having examined the lacerated foot, fetched a ſhell from the beach, which he broke to a point with his teeth; with which inſtrument he laid open the wound, and extracted the ſplinter. Whilſt this operation was performing, the old man went a little way into the wood, and returned with ſome gum, which he applied to the wound upon a piece of the cloth that was wrapped round him, and in two days time it was perfectly healed. This gum was produced by the apple-tree; the ſurgeon of the ſhip procured ſome of it, and uſed it as a vulnerary balſam with great ſucceſs. Captain Cook, in 1769, ſaw many of the natives with dreadful ſcars; one man, in particular, whoſe face was almoſt entirely deſtroyed: his noſe, including bone, was perfectly flat; and one cheek and one eye were ſo beaten in, that the hollow would almoſt receive a man's fiſt; yet no one ulcer remained.

The venereal diſeaſe is ſaid to have been entailed upon theſe people by the crew of M. de Bougainville's ſhips, who viſited this iſland a ſhort time after Captain Wallis had left it. In 1769, more than one-half of the crew in Captain Cook's ſhip had contracted it, during a month's ſtay here. The natives diſtinguiſhed it by a name of the ſame import with rottenneſs, but of a more extenſive ſignification. They deſcribed, in the moſt pathetic terms, the ſufferings which the firſt victims to its rage endured; and told him that it cauſed the hair and the nails to fall off, and the fleſh to rot from the bones; that it ſpread an univerſal terror and conſternation among the inhabitants, ſo that the ſick were abandoned by their neareſt relations, leſt the calamity ſhould ſpread by contagion, and were left to periſh alone in ſuch miſery as till then had never been known among them. But there ſeems to be ſome reaſon to hope that they had found out a ſpecific cure for it, as none were ſeen on whom it had made a great progreſs; and one who went from the ſhip infected, returned, after a ſhort time, in perfect health. Both Captain Cook and Mr Forſter, in their relations of their voyage in the Reſolution, endeavour to eſtabliſh the opinion, that this ſcourge of licentiouſneſs was felt in the South-Sea iſlands, previous to any of the modern voyages that have been made thither, and that it was an indigenous diſeaſe there. But if that concluſion is well founded, how comes it, that at all the places where the Reſolution touched in 1773, which had been before viſited by the Endeavour in 1769, ſuch as New Zealand for inſtance, the crew, more or leſs, became infected by their commerce with the women, and not at all ſo at places which they viſited, for the firſt time, in the Reſolution?

10
Manufactures.

The principal manufacture among the Otaheiteans is their cloth. This is made of the bark of trees, which are of three kinds, *viz.* the Chineſe mulberry-tree, or *aouta;* the bread-fruit tree, or *ooroo;* and one that is deſcribed by Dr Hawkeſworth as reſembling the wild fig-tree of the Weſt Indies. Of all theſe the paper mulberry affords the beſt cloth; what is made from that being both finer, ſofter, whiter, and better ſuited to take a colour; the *ooroo* produces cloth much inferior in contexture; and the laſt is very coarſe, in colour reſembling the darkeſt brown paper; but this laſt is the only kind that withſtands water. See the article Bark.—They likewiſe prepare a red dye; which is made by mixing the yellow juice of a ſmall ſpecies of fig, which the natives call *mattes,* with the greeniſh juice of a ſort of fern or bindweed, or of ſeveral other plants, which produce a bright crimſon: and this the women rub with their hands, if the piece is to be uniformly of a colour; or they make uſe of a bamboo reed if the piece is to be marked, or ſprinkled into different patterns. The colour fades very ſoon, and becomes of a dirty red; but notwithſtanding this defect, and its being liable to be ſpoiled by rain, the cloth thus ſtained is highly valued, and is worn only by the principal inhabitants of the country. The inhabitants perfume their clothes with certain plants; concerning which, Mr Forſter made all poſſible inquiry. Tahea, a friendly native, ſhewed him ſeveral plants which are ſometimes uſed as ſubſtitutes; but the moſt precious ſort he either could not, or would not point out: and from the account of Omai it appears, that there are no leſs than 14 different ſorts of plants employed for this purpoſe.

Matting is another Otaheitean manufacture; and in this they are ſo dextrous, that they produce finer mats than any made in Europe. Ruſhes, graſs, the bark of trees, and the leaves of a plant called *wharrou,* are the materials which they work up for this purpoſe. Their matting is applied to various uſes: the coarſer kind is employed for ſleeping on in the night, or ſitting on through the day; the finer ſort is converted into garments in rainy weather, their cloth being ſoon penetrated by wet. They are very dextrous in making baſket and wicker-work: their baſkets are of a vaſt number of different patterns, many of them exceedingly neat; and the making them is an art practiſed by every one, both men and women.

Inſtead of hemp, they make ropes and lines of the bark of a tree; and thus they are provided with fiſhing-nets; the fibres of the cocoa-nut furniſh them with thread, with which they faſten the different parts of their canoes, &c. The bark of a nettle which grows in the mountains, and is called *orawa,* ſupplies them with excellent fiſhing-lines, capable of holding any kind of fiſh; and their hooks are made of mother-of-pearl, to which they fix a tuft of hair, made to reſemble the tail of a fiſh. Inſtead of making them bearded, the point is turned inwards. They make alſo a kind of ſeine of a coarſe broad graſs, the bladder of which are like flags. Theſe they twiſt and tie together in a looſe manner, till the net, which is about as wide as a large ſack, is from 60 to 80 fathoms long. This they haul in ſmooth ſhoal water; and its own weight keeps it ſo cloſe to the ground, that ſcarcely a ſingle fiſh can eſcape. They make harpoons of cane, and point them with hard wood; with which they can ſtrike fiſh more effectually than an European can with one headed with iron.

11
Working-tools.

The tools uſed by the Otaheiteans for all their purpoſes are, an adze, made of ſtone; a chiſel or gouge, made of bone, generally the bone of a man's arm between the wriſt and elbow; a raſp of coral, and the ſkin of a ſting-ray; alſo coral and ſand, as a file or poliſher; and with theſe they fell timber, cleave and poliſh it, and hew ſtone. The ſtone which makes the blade of their adzes is a kind of baſaltes, of a grey or blackiſh colour; not very hard, but of conſiderable toughneſs: they are formed of different ſizes; ſome that are intended for felling, weigh from ſix to eight pounds; others that are uſed for carving, not more than as many ounces: but it is neceſſary to ſharpen theſe rude tools almoſt every minute; for which purpoſe a cocoa-nut ſhell full of water and a ſtone are always at hand. With ſuch tools they generally take up ſeveral days in felling a tree; but after it is down, and ſplit into planks, they ſmooth them very dexterouſly and expeditiouſly with their adzes, and can take off a thin coat from a whole plank without miſſing a ſtroke.

12 Weapons. Their weapons are ſlings, which they uſe with great dexterity; pikes headed with the ſtings of ſting-rays; and clubs of about ſix or ſeven feet long, made of a very hard wood. Thus armed, they are ſaid to fight with great obſtinacy; and to give no quarter to man, woman, or child, who happens to fall into their hands during the battle, nor for ſome time afterwards, till their paſſion ſubſides. They have likewiſe bows and arrows; but the arrows are good for nothing except to bring down a bird, being headed only with ſtone, and none of them pointed. They have targets of a ſemicircular form, made of wicker-work, and plaited ſtrings of the cocoa-nut fibres, covered with gloſſy, bluiſh-green feathers belonging to a kind of pigeon, and ornamented with many ſhark's-teeth, arranged in three concentric circles.

13 Canoes. Their boats or canoes are of three different ſorts. Some are made out of a ſingle tree, and hold from two to ſix men. Theſe are principally employed in fiſhing; the others are conſtructed of planks very dexterouſly ſewed together; they are of different ſizes, and will hold from 10 to 40 men: they generally laſh two of theſe together, and ſet up two maſts between them; or if they are ſingle, they have an outrigger on one ſide, and only one maſt in the middle; and in theſe veſſels they will ſail far beyond the ſight of land. The third ſort ſeems to be principally deſigned for pleaſure or ſhew. Theſe are very large, but have no ſail; and in ſhape reſemble the gondolas of Venice. The middle is covered with a large awning; and ſome of the people ſit upon it, and ſome under it. The plank of which theſe veſſels are conſtructed, is made by ſplitting a tree, with the grain, into as many thin pieces as poſſible. The boards are brought to the thickneſs of about an inch, and are afterwards fitted to the boat with the ſame exactneſs that might be expected from an expert joiner. To faſten theſe planks together, holes are bored with a piece of bone fixed into a ſtick for that purpoſe. Through theſe holes a kind of plaited cordage is paſſed, ſo as to hold the planks ſtrongly together. The ſeams are caulked with dry ruſhes; and the whole outſide of the veſſel is painted over with a kind of gummy juice, which ſupplies the place of pitch.

14 Character, manners, &c. The Otaheiteans are a very induſtrious people, and friendly in their diſpoſitions; but, like all other nations not fully civilized, their paſſions are extremely violent, and they are very fickle. The manner of ſingling out a man here for a choſen friend is by taking off a part of your clothing and putting it upon him. Their uſual manner of expreſſing their reſpect to ſtrangers, or to their ſuperiors, at a firſt meeting, is by uncovering themſelves to the middle. They have a cuſtom of ſaluting thoſe who ſneeze, by ſaying *evaroeia-t eatoua*, "May the good eatoua awaken you," or "May not the evil eatoua lull you aſleep!"

Their propenſity to theft is very great, inſomuch, that Mr Bougainville ſays, "even in Europe itſelf one cannot ſee more expert filchers than the people of this country;" and indeed, in all the voyages made by Captain Cook and others, they had abundant experience of this diſpoſition of the natives, which often produced quarrels, and ſometimes even fatal effects. In their behaviour they are extremely laſcivious, almoſt beyond credibility. A woman of diſtinction who viſited Mr Banks uſed the following ceremony on her firſt approach to the ſtranger. After laying down ſeveral young plantain-leaves, a man brought a large bundle of cloth; which having opened, he ſpread it piece by piece on the ground, in the ſpace between Mr Banks and his viſitants. There were in all nine pieces: having ſpread three pieces one upon another, the lady came forward, and, ſtepping upon them, took up her garments all around her to her waiſt; ſhe then turned three times round, after which ſhe dropped the veil: when other three pieces were ſpread, ſhe practiſed the ſame ceremony; and ſo the third time, when the laſt three pieces were laid out: after which the cloth was again rolled up, and delivered to Mr Banks as a preſent from the lady, who with her attending friend came up and ſaluted him. From the unbridled licentiouſneſs of theſe people, the French gave this iſland the name of the *New Cythera*. Nay, to ſuch a degree do they carry their libidinous exceſſes, that a number of the principal people, it is related, have formed themſelves into a ſociety, in which every woman is common to every man. This ſociety is diſtinguiſhed by the name of *Arreoy*, the members of which have meetings from which all others are excluded. At theſe meetings the paſſions are excited by a ſtudied courſe of ſenſuality, and the coarſeſt and moſt brutal pleaſures are enjoyed by the whole company. If, however, notwithſtanding theſe exceſſes, any of the female members of this community ſhould prove with child, unleſs ſhe can procure ſome man to adopt the child as his own, not all the ſtrong affections of a mother, if ſuch are not entirely eradicated by a courſe of life ſubverſive of the feelings as well as the modeſty of nature, can ſave the life of the precondemned innocent; but the child as ſoon as born is ſmothered, and the mother is left at liberty to renew her former courſe of execrable proſtitution. Should any man be found to cooperate with a woman in ſaving the life of a child, they are both excluded for ever from the *arreoy*, and are conſidered as man and wife. The woman from that time is diſtinguiſhed by the term *whannow-now*, "the bearer of children;" which in this part of the world only is conſidered as a term of reproach; and ſo depraved are theſe people, that being a member of ſuch a ſociety is boaſted of as being a privilege, inſtead of being ſtigmatiſed as the fouleſt crime. The arreoys enjoy ſeveral privileges, and are greatly reſpected throughout the Society Iſlands, as well as at Otaheitee; nay, they claim a great ſhare of honour from the circumſtance of being childleſs. Tupia, one of the moſt intelligent natives, when he heard that the king of England had a numerous offſpring, declared, that he thought himſelf much greater, becauſe he belonged to the arreoys. That this ſociety indulge themſelves in promiſcuous embraces, and that every woman is common to every man, is contradicted by Mr Forſter. He ſays, that theſe arreoys chooſe their wives and miſtreſſes from among the proſtitutes; and from this circumſtance, as well as their extreme voluptuouſneſs, they have ſeldom any reaſon to dread the intruſion of children. He had the following circumſtances related to him by Omai or Omiah, one of the natives, who was brought to England. He ſaid, that the pre-eminence and advantages which a man enjoyed as arreoy were ſo valuable, as to urge him againſt his own feelings to deſtroy his child; that the mother was never willing to conſent to the murder; but that her huſband and other arreoys perſuaded her to yield up the child; and that where intreaties were not ſufficient, force was ſometimes made uſe of. But above all, he added, that this action was always perpetrated in ſecret; inſomuch, that not even the *towtows* or attendants of the houſe were preſent; becauſe, if it were ſeen, the murderers would be put to death.

Both men and women conſtantly waſh their whole bodies three times a-day in running water, and are remarkably cleanly in their clothes. They are moſt expert ſwimmers, being accuſtomed to the water from their infancy. Captain Cook relates the following remarkable inſtance of their expertneſs. On a part of the ſhore where a tremendouſly high ſurf broke, inſomuch that no European boat could live in it, and the beſt European ſwimmer, he was perſuaded, would have been drowned, as the ſhore was covered with pebbles and large ſtones, yet here were 10 or 12 Indians ſwimming for their amuſement, Whenever a ſurf broke near them, they dived under it, and roſe again on the other ſide. The ſtern of an old canoe added much to their ſupport. This they took out before them, and ſwam with it as far as the outermoſt breach; when two or three getting into it, and turning the ſquare end to the breaking wave, were driven in towards the ſhore with incredible rapidity, ſometimes almoſt to the beach: but generally the wave broke over them before they got half way; in which caſe they dived, and roſe to the other ſide with the canoe in their hands, and ſwimming out with it again, were again driven back. This amazing expertneſs drew the Captain's attention for more than half an hour; during which time none of the ſwimmers attempted to come aſhore, but ſeemed to enjoy the ſport in the higheſt degree. At another time, one of the officers of the quarter-deck intending to drop a bead into a canoe for a little boy of ſix years of age, it accidentally miſſed the boat, and fell into the ſea; but the child immediately leaped overboard, dived after it, and recovered it. To reward him for this feat, ſome more beads were dropped to him; which excited a number of men and women to amuſe the officers with their amazing feats of agility in the water, and not only fetched up ſeveral beads ſcattered at once, but likewiſe large nails, which, from their weight, deſcended quickly to a conſiderable depth. Some of theſe people continued a conſiderable time under water; and the velocity with which they were ſeen to go down, the water being extremely clear, was very ſurpriſing. Here a green branch of a tree is uſed as an emblem of peace, in exact conformity to the cuſtom of the ancient nations.

15 Language, &c. The language of theſe iſlanders is ſoft and melodious; it abounds with vowels, and the pronunciation of it is eaſily acquired: but it was found exceſſively difficult to teach the natives to pronounce a ſingle Engliſh word; probably not only from its abounding with conſonants, but from ſome peculiarity in its ſtructure; for Spaniſh and Italian words, if ending in a vowel, they pronounced with the greateſt eaſe. A ſufficient acquaintance has not been formed with it to determine whether it is copious or not; but it is certainly very imperfect, being totally without inflexion either of nouns or verbs. Few of the nouns have more than one caſe, and few of the verbs more than one tenſe. It was impoſſible to teach the iſlanders to pronounce the names of their gueſts. They called Captain Cook *Toote;* Mr Hicks, the firſt lieutenant *Hete*, &c. and in this manner they formed names for almoſt every man in the ſhip. In ſome, however, it was not eaſy to find any traces of the original; and they were perhaps not mere arbitrary ſounds formed upon the occaſion, but ſignified words in their own language; and it ſeems that they could perfectly remember theſe appellations at the diſtance of four years, by their inquiries after ſuch gentlemen as were abſent on the ſecond voyage by name. Mr Monkhouſe, a midſhipman, they called *Matte*, which in their language ſignifies *dead;* becauſe he commanded a party that killed a man for ſtealing a muſket. The neareſt imitation they could reach of king George, was by calling him *Kihiargo*.

A map of Otaheitee, engraved for Captain Cook's firſt voyage, was taken out, and laid before Tuahow the high admiral, without informing him of what it was; however, he immediately found it out, and was overjoyed to ſee a repreſentation of his own country. He pointed out all the diſtricts of it, naming every one of them in their order.

Theſe people have a remarkable ſagacity in foretelling the weather, particularly the quarter from whence the wind will blow. In their long voyages they ſteer by the ſun in the day, and in the night by the ſtars; all of which they diſtinguiſh by ſeparate names, and know in what part of the heavens they will appear in any of the months during which they are viſible in their horizon. They alſo know the times of their annual appearing and diſappearing, with more preciſion than would eaſily be believed by an European aſtronomer. Their time they ſeem to reckon by moons, 13 of which make a year. The day they divide into ſix parts, and the night into an equal number. They judge of the time of the day by the height of the ſun, but they cannot aſcertain the time of the night by the ſtars. In numeration, the greateſt length they can go is 200; that is, when they have counted each of their fingers and toes ten times over. When they take the diſtance from one place to another, they expreſs it by the diſtance which is required to paſs it.

16 Government. The government of the Otaheiteans ſeems greatly to reſemble the early ſtate of the European nations under the feodal ſyſtem. Their orders of dignity are *earee-rahie*, which anſwers to king; *earee*, baron; *manahouni*, vaſſal; and *towtow*, villein. There are two kings in the iſland, one being the ſovereign of each of the peninſulas of which it conſiſts. Each of them is treated with great reſpect by all ranks, but does not appear to be inveſted with ſo much power as is exerciſed by the earees in their own diſtricts. When the king, whom they called *O-Too*, made a viſit to Captain Cook, the chiefs, who happened to be there before him, immediately ſtripped themſelves in great haſte. Captain Cook took notice of it, upon which they ſaid *earee, earee*, ſignifying, that it was on account

heitee. count of O-Too being preſent: but this was the only outward token of reſpect they paid him; for they never roſe from their ſeats, or made any other obeiſance.

The *earees* are lords of one or more of the diſtricts into which each of the peninſulas is divided, and of which there are 43 in the larger one. Theſe parcel out their territories to the *manahounis*, who ſuperintend the cultivation of the ground. The loweſt claſs, called *tow-tows*, ſeem to be nearly under the ſame circumſtances with the villeins in feodal governments. They do all the laborious work, cultivate the land, catch fiſh, fetch wood and water, &c. Each of the earees keeps a kind of court, and has a great number of attendants, chiefly the younger brothers of their own tribe; and among theſe ſome hold particular offices, but of which little more is known than ſome of their names.

In this country a child ſucceeds to his father's titles and authority as ſoon as he is born; and thus the king no ſooner has a ſon born, than his ſovereignty ceaſes. A regent is then choſen; and the father generally retains his power under that title, until his child becomes of age. The child of the baron ſucceeds to the titles and honours of its father as ſoon as it is born, as well as the ſon of the king; ſo that a baron who was yeſterday called *earee*, and was approached with the ceremony of lowering the garments, ſo as to uncover the upper part of the body, is to-day, if his wife happens to be delivered of a child, reduced to the rank of a private man; all marks of reſpect being transferred to the child, if it is ſuffered to live, though the father ſtill continues poſſeſſor and adminiſtrator of his eſtate. But the acquieſcence which the lower claſs of people, or *towtows*, yield to the command of their chiefs, is very remarkable. They are not ſuffered to taſte any animal-food, although they are employed in feeding it for their lords. They endure patiently very ſevere blows, if, when collected into a large body, they in any manner preſs upon or annoy the king or a chief in his progreſs: and all this paſſive ſpirit is preſerved without any power being lodged in the hands of the king to exact it; for he uſes no military force, nor is even attended with body-guards.

There are but few actions which are reckoned crimes among the Otaheiteans. Adultery, however, is ſometimes puniſhed with death; but in general, the woman eſcapes with a ſevere beating, and the gallant paſſes unnoticed. The regulation of public juſtice is not confined to the magiſtrate; for the injured party redreſſes his own wrong by inflicting whatever puniſhment he can upon the offender: but in matters of notorious wrong, the chiefs ſometimes interpoſe. The nobility have livery for their ſervants; and in proportion as the maſter's rank is more or leſs elevated, theſe ſaſhes are worn higher or lower, being faſtened cloſe under the arms of the ſervants belonging to the chiefs, and going round the loins of thoſe belonging to the loweſt claſs of nobility. Several parts of the iſland ſeem to be private property, which deſcend to the heir of the poſſeſſor on his death, and the deſcent ſeems to fall indifferently on man or woman. Captain Cook was of opinion, that the number of inhabitants on the whole iſland amounted to 204,000, including women and children.

Otaheitee. The religious language of the Otaheiteans, like that of the Gentoo Bramins, is different from what is uſed in common diſcourſe; but, according to the accounts we have of their notions concerning the origin of the world, nothing can be more ridiculous. They imagine that the Supreme Deity, beſides a great many
17 Religion. female deſcendants, has one ſon named *Tane*; and to him they direct their worſhip, though they do not believe that the good or bad conduct of mankind here on earth makes them more or leſs acceptable to this divinity. They believe the exiſtence of the ſoul after death, and of a greater or leſſer degree of happineſs to be then enjoyed; but they ſeem to have no conception of a ſtate of puniſhment or of ſuffering hereafter. The ſhare of happineſs which they imagine every individual will enjoy in this future ſtate, will be aſſigned to him according to the rank he holds on earth. We are not, however, told wherein they ſuppoſe the happineſs of this future ſtate to conſiſt; but it is moſt probably a pretty exact imitation of a Mahommedan paradiſe, for theſe voluptuaries can hardly be ſuppoſed capable of imagining any pleaſure independent of the intercourſe of the ſexes.

The prieſthood ſeems to be hereditary in one family or tribe; and as it is ſaid to be numerous, probably thoſe of that order are reſtrained from becoming members of the Arreoy: but whether or not any peculiar decorum is neceſſary to be obſerved, hath not yet appeared. Theſe prieſts are profeſſedly the men of ſcience: but their knowledge is altogether frivolous and uſeleſs; for it conſiſts in being converſant with the names of their different divinities, and ſuch abſurd traditions as have been handed down among them from one generation to another. Their religious notions being depoſited in an unknown tongue, they are reſpected becauſe they are not underſtood; and as the cure of the ſoul is no object of regard, the moſt important concern to theſe people, the cure of their bodies, is committed to the prieſts, and much parade is uſed in their attempts to recover the ſick, though their remedies conſiſt of ridiculous ceremonies and enchantments rather than any thing elſe.

The marriages of theſe people are merely ſecular contracts: but no one has a right to perform the operation of tattowing, except the prieſts; and this being a cuſtom univerſally adopted by the natives, it may be ſuppoſed, that the performing it is a very lucrative employment. The males in general undergo a kind of circumciſion, which it is diſgraceful not to comply with, and which is likewiſe the excluſive privilege of the prieſts to perform. But what moſt eſtabliſhes the credit of this order of men is their ſkill in aſtronomy and navigation.

Captain Cook, who had ſome reaſon to believe that, among the religious cuſtoms of this people, human ſacrifices were ſometimes offered up to their deities, went to a morai, or place of worſhip, accompanied by Captain Furneaux, having with them a ſailor who ſpoke the language tolerably well, and ſeveral of the natives. In the marai was a tupapow, a kind of bier, with a ſhed erected over it, on which lay a corpſe and ſoms proviſions. Captain Cook then aſked if the plaintain were for the Eatua? If they ſacrificed to the Eatua hogs, dogs, fowls, &c.? To all of which an intelligent native anſwered in the affirmative. He then aſked if they ſacrificed men to the Eatua? He was anſwered, *taato eno*, "bad men they did; firſt *tiparrahy*, beating them till they were dead." He then aſked if good men were put to death in this manner? His anſwer was no, only *taato eno*. The Captain then aſked if any Earees were? The native replied, they had hogs to give the Eatua, and again repeated *taato eno*. He was then aſked if towtows, who had no hogs, dogs, or fowls, but yet were good men, were ever ſacrificed to the Eatua? The anſwer ſtill was no, only bad men. Many other queſtions were put to him; all his anſwers to which ſeemed to confirm the ideas that men for certain crimes were condemned to be ſacrificed to the gods, provided they did not poſſeſs any property which they might give for their redemption. However, in purſuing ſuch inquiries as theſe, no certain information could be obtained, on account of the ſlight knowledge which had been acquired of the language of the country: but according to further accounts which Captain Cook received from Omai, it ſeems to reſt with the high-prieſt to ſingle out the victims for ſacrifice; who, when the people are aſſembled on any ſolemn occaſion, retires alone into the houſe of God, and ſtays there for ſome time; when he comes out, he informs the aſſembly that he has ſeen and converſed with the great god, (the high-prieſt alone having that privilege), and that he has aſked for a human ſacrifice; and tells them he has deſired ſuch a perſon, naming a man preſent, who has moſt probably, on ſome account or other, rendered himſelf obnoxious to this ghoſtly father. The words are no ſooner gone out of his mouth, than the devoted wretch is put to death; for his guilt cannot be doubted, after the oracle has pronounced his doom.

On this iſland was ſeen the figure of a man conſtructed of baſket-work, rudely made, but not ill deſigned: it was ſomething more than ſeven feet high, and rather too bulky in proportion to its height. This wicker ſkeleton was completely covered with feathers, which were white where the ſkin was to appear, and black in the parts which it is their cuſtom to paint or ſtain, as well as upon the head, which was deſigned to repreſent hair. Upon the head alſo were four protuberances; three in front, and one behind, which the Indians called *tate ete*, little men. The image was called *Manioe*; it was a repreſentation of *Mauwe*, one of their Eatuas, or gods of the ſecond claſs, and was ſaid to be the only one of the kind on Otaheitee.

Theſe people pray at ſun-riſe and ſun-ſet. They have alſo a number of ſuperſtitious practices, in order to conciliate the influence of evil genii. E-Tee, a chief, who ſeemed to be the king's prime miniſter in 1774, very ſeriouſly aſked Mr Forſter whether they had a god (*Eatau*) in their country, and whether they prayed to him (*epoore?*) When he told them that they acknowledged a Divinity who had made every thing, and was inviſible, and that they were accuſtomed to addreſs their petitions to him, he ſeemed to be highly pleaſed, and repeated their words with comments of his own, to ſeveral perſons who ſat round him; ſeeming thereby to intimate, that the ideas of his countrymen correſponded with theirs in this reſpect.

Their marais are uſed both as burying-grounds and places of worſhip; they are approached with the moſt wonderful expreſſions of reverence and humility; and this, it ſhould ſeem, not becauſe any there is eſteemed ſacred, but becauſe they there worſhip an inviſible being, for whom they entertain the moſt reverential reſpect, although not excited by the hope of reward, or the dread of puniſhment. Though they do not appear to have any viſible object of worſhip, yet, ſays Captain Cook, this iſland, and indeed the reſt that lie near it, have a particular bird, ſome a heron, and others a king-fiſher, to which they pay a particular regard, and concerning which they have ſome ſuperſtitious notions, reſpecting good or bad fortune, as we have of the ſwallow and robin-redbreaſt, and will on no account moleſt or kill them. One of theſe cemetries, or places of worſhip, was known to Captain Cook, on his firſt voyage, by the name of Tootahah's marai, then the regent; but when, on his ſecond voyage, after the death of that chief, he called it by that name, Maratata, a chief that accompanied the party, interrupted him, intimating, that it was no longer Tootahah's after his death, but was then known as O-Too's marai, the then reigning prince. A fine moral for princes! daily reminding them of mortality whilſt they live, and teaching them, that after death they cannot call even that ground their own which their dead corpſe occupies! The chief and his wife, on paſſing by it, took their upper garments from their ſhoulders. From hence it ſhould ſeem, that the royal family have a particular marai, and that it always bears the name of the reigning prince.

19 Funerals.

An Indian, who had ſnatched away a muſket from a ſentry whilſt on duty, was, by the inhumanity of a midſhipman who commanded the guard, purſued and ſhot. The unhappy fate of this poor fellow gave an opportunity for ſeeing the manner in which theſe people treat their dead. They placed the corps in the open air till the bones became quite dry: a ſhed was erected cloſe by the houſe where the deceaſed had reſided; it was about 15 feet long, and eleven broad; one end was left quite open; the other end, and the two ſides, were partly incloſed with a ſort of wicker-work. The bier was a frame of wood, like that on which the ſea-beds, called *cots*, are placed, with a matted bottom, and ſupported by four poſts, at the height of about four feet from the ground. The body was covered firſt with a mat, and then with white cloth; by the ſide of it lay a wooden mace, one of their weapons of war; and near the head of it, which lay next to the cloſe end of the ſhed, lay two cocoa-nut ſhells; at the other end a bunch of green leaves, with ſome dried twigs, all tied together, were ſtuck in the ground, by which lay a ſtone about as big as a cocoa-nut. Near theſe lay one of the young plaintain-leaves that are uſed for emblems of peace, and cloſe by it a ſtone ax. At the open end of the ſhed alſo hung, in ſeveral ſtrings, a great number of a palm-nuts; and without the ſhed was ſtuck up in the ground a ſtem of a plantain tree, about ſix feet high, upon the top of which was placed a cocoa-nut ſhell full of freſh water; againſt the ſide of one of the poſts hung a ſmall bag, containing a few pieces of bread-fruit ready roaſted, which had not been put in all at one time, ſome being freſh, and others ſtale. This minute examination of their manner of treating their dead, ſeemed to be very unwelcome to the natives. The food ſo placed by the corps is deſigned as an offering to their gods. They caſt in, near the body, ſmall pieces of cloth, on which the tears and blood of the mourners have been ſhed; for in their paroxiſms of grief it is an univerſal cuſtom to wound themſelves with a ſhark's tooth. The mourner is always a man; and he is dreſſed in a very ſingular habit. When the bones are ſtripped of their fleſh, and become dry, they are buried. This regard to their dead is very remarkable: one of the ſhip's company happening to pull a flower from a tree which grew on one of their ſepulchral incloſures, an Indian came ſuddenly behind him and ſtruck him; and a party of ſailors, who were ſent to get ſome ſtones for ballaſt for the ſhip, had like to have been embroiled with the natives, by pulling down ſome part of an incloſure of this kind. The ſhade under which their dead are laid is called *tupapow;* the incloſure in which their bones are depoſited is called *morai;* theſe latter, as has been already related, are alſo places of worſhip. As ſoon as a native of Otaheitee is known to be dead, the houſe is filled with relations, who deplore their loſs; ſome by loud lamentations, and ſome by leſs clamorous, but more genuine expreſſions of grief. Thoſe who are in the neareſt degree of kindred, and are really affected by the event, are ſilent; the reſt, are one moment uttering paſſionate exclamations in a chorus, and the next laughing and talking without the leaſt appearance of concern. In this manner the remainder of the day on which they aſſemble is ſpent, and all the ſucceeding night. On the next morning the body is ſhrouded in their cloth, and conveyed to the ſea-ſide on a bier, which the bearers ſupport upon their ſhoulders, attended by the prieſt, who having prayed over the body repeats his ſentences during the proceſſion. When it arrives at the water's edge, it is ſet down upon the beach; the prieſt renews his prayers, and taking up ſome of the water in his hands, ſprinkles it towards the body, but not upon it. It is then carried back 40 or 50 yards; and ſoon after brought again to the beach, where the prayers and ſprinkling are repeated. It is thus removed backwards and forwards ſeveral times; and while theſe ceremonies have been performing, a houſe has been built, and a ſmall ſpace of ground railed in. In the centre of this houſe, or *tupapow*, as they term it, poſts are ſet up to ſupport the bier, which is at length conveyed thither, and placed upon it; and here the body remains to putrify, till the fleſh is wholly waſted from the bones. Theſe houſes of corruption are of a ſize proportioned to the rank of the perſon whoſe body they are to contain. Thoſe allotted to the lower claſs are juſt ſufficient to cover the bier, and have no railing round them. The largeſt that was ſeen was 11 yards long; and ſuch are ornamented according to the abilities and inclination of the ſurviving kindred, who never fail to lay a profuſion of good cloth about the body, and ſometimes almoſt cover the outſide of the houſe. Garlands of the fruit of the palm-nut, or pandanus, and cocoa-leaves, twiſted by the prieſts in myſterious knots, with a plant called by them *ethee no morai*, which is particularly conſecrated to funeral ſolemnities, are depoſited about the place; proviſion and water are alſo left at a little diſtance. As ſoon as the body is depoſited in the tupapow, the mourning is renewed. The women aſſemble, and are led to the door by the neareſt relation, who ſtrikes a ſhark's tooth ſeveral times into the crown of her head; the blood copiouſly follows, and is carefully received upon pieces of linen, which are thrown under the bier. The reſt of the women follow this example; and the ceremony is repeated at the interval of two or three days, as long as the zeal and ſorrow of the parties hold out. The tears alſo which are ſhed upon theſe occaſions, are received upon pieces of cloth, and offered as oblations to the dead. Some of the younger people cut off their hair, and that is thrown under the bier with the other offerings. This cuſtom is founded on a notion, that the ſoul of the deceaſed, which they believe to exiſt in a ſeparate ſtate, is hovering about the place where the body is depoſited; that it obſerves the actions of the ſurvivors, and is gratified by ſuch teſtimonies of their affectionate grief. Whilſt theſe ceremonies are carrying on by the women, the men ſeem to be wholly inſenſible of their loſs; but two or three days after, they alſo begin to perform a part. The neareſt relations take it in turn to aſſume the dreſs, and perform the offices.

The chief mourner carries in his hand a long flat ſtick, the edge of which is ſet with ſharks teeth; and in a phrenzy, which his grief is ſuppoſed to have inſpired, he runs at all he ſees, and if any of them happen to be overtaken, he ſtrikes them moſt unmercifully with his indented cudgel, which cannot fail to wound them in a dangerous manner. The proceſſions continue at certain intervals for five moons; but are leſs and leſs frequent, by a gradual diminution, as the end of that time approaches. When it is expired, what remains of the body is taken down from the bier; and the bones, having been ſcraped and waſhed very clean, are buried according to the rank of the perſon, either within or without a morai. If the deceaſed was an earee, or chief, his ſkull is not buried with the reſt of his bones, but is wrapped up in fine cloth, and put in a kind of box made for that purpoſe, which is alſo placed in the morai. This coffin is called *ewharre no te orometua*, "the houſe of a teacher, or maſter." After this the mourning ceaſes, except ſome of the women continue to be really afflicted at the loſs, and in that caſe they will ſuddenly wound themſelves with the ſhark's tooth wherever they happen to be. The ceremonies, however, do not ceaſe with the mourning; for prayers are ſtill ſaid by the prieſt, and offerings made at the morai. Some of the things, which from time to time are depoſited there, are emblematical: a young plantain is ſaid to repreſent the deceaſed, and a bunch of feathers the Deity who is invoked. The prieſt places himſelf overagainſt the ſymbol of the god, accompanied by ſome of the relations, who are furniſhed with a ſmall offering: he repeats his oriſon in a ſet form, conſiſting of ſeparate ſentences; at the ſame time weaving the leaves of the cocoanut into different forms, which he afterwards depoſits upon the ground where the bones have been interred: the Deity is then addreſſed by a ſhrill ſcreech, which is uſed only upon that occaſion. When the prieſt retires, the tuft of feathers is removed, and the proviſions are left to putrify, or be devoured by the rats.

This ceremony of mourning, as deſcribed above, was performed by Tirope, one of the wives of Tubourai Tamaide; who, when the bleeding from the wounds which ſhe had thus given herſelf ceaſed, looked up with a ſmile on the company round her, and who had before inquired of her, very earneſtly, the cauſe of her behaviour, without receiving any anſwer, or having been at all noticed by her. She then began to pick up ſome ſmall pieces of cloth which ſhe had ſpread to catch the blood; and having got them all together, ſhe went to the ſhore, and threw them into the ſea. She then plunged into the river; and having waſhed her whole body, returned to the company as cheerful as ever. To add to the ſingularity of this conduct, the Indians who ſtood round her all the time that this frantic diſtreſs was performing, converſed with great indifference and jocularity.

There is not a more ancient cuſtom handed down to us than that of cutting the body to expreſs grief and diſtreſs of mind. In the code of laws delivered by Moſes to the Iſraelites, 1400 years before the Chriſtian æra, this practice is expreſsly forbidden to that people: “Ye ſhall not cut yourſelves, or make any baldneſs between the eyes for the dead,” Deut. xiv. 1. Hence it may be ſuppoſed that this rite prevailed in Egypt, from whence the Jews derived moſt of thoſe propenſities which were inhibited by their great legiſlator. We are told likewiſe in the book of Kings, of the prieſts of Baal wounding themſelves, after they had long waited in vain for the ſupernatural intervention of their idol. D'Arvieux informs us, that the modern Arabs retain the ſame cuſtom, and that the part they chiefly wound is their arms. The difference in the practice as now prevailing in O-Taheitee and Arabia ſeems to be, that in the firſt none but the women make uſe of it, and in the latter it is confined to the men, and generally uſed to expreſs their deſperate paſſion for ſome favourite miſtreſs.

The mourning which is worn here is an head-dreſs of feathers, the colour of which is conſecrated to death, and a veil over the face. This dreſs is called *eeva*. The whole nation is ſaid to appear thus on the death of their king. The mourning for fathers is very long. The women mourn for their huſbands, but not the huſbands for their wives.

We ſhall conclude this account of Otaheitee with the hiſtory of *Omai*, or as he is improperly called *Omiah*, who was brought over to England. He was a native of Ulietea, or Raietea; and embarked at Huahine with Captain Furneaux, on board the adventure, in September 1773; and the two ſhips ſeparating in a ſtorm on the coaſt of New-Zealand a few months afterwards, the voyage of the Adventure was brought to a much earlier concluſion than that of the Reſolution, for ſhe arrived at Spithead the 14th of July following. This youth is ſaid to have had ſome property in his native ſoil, of which he was diſpoſſeſſed by the people of Bolabola; but he was not one of the earees, or gentry of that country, but of the middling claſs of people. He was eminent neither for figure, ſhape, nor complexion; his colour being of a deep hue, reſembling a towtow, or one of the common people; and both Captain Cook and Mr Forſter agree in thinking him no proper ſample of the inhabitants of thoſe iſlands, in reſpect to perſonal beauty. However, they are both of opinion, that the qualities of his heart and head reſembled thoſe of his countrymen in general, and that no one of the natives would have given more general ſatisfaction by his behaviour whilſt he remained in England. He is deſcribed as poſſeſſing a good underſtanding, quick parts, and honeſt principles: not an extraordinary genius like Tupia; yet not at all deficient in intelligence, which appears from his knowledge of the game of cheſs, in which he made an amazing proficiency. His principal patrons, whilſt in England, were, the earl of Sandwich, Mr Banks, and Doctor Solander. His noble patron introduced him to his Majeſty at Kew; and, during his ſtay in England, he was careſſed by many of the principal nobility. He naturally imitated that eaſy and elegant politeneſs which is prevalent among the great, and which is one of the ornaments of civilized ſociety. Indeed he adopted the manners, the occupations, and amuſements of his companions in general, and gave many proofs of a quick perception, and a lively fancy. He appears, however, to have been treated, whilſt he reſided here, rather as a faſhionable exhibition, than as a rational being. No attention ſeems to have been paid to the enriching his mind with uſeful knowledge, ſuch as might have rendered him a valuable acquiſition to his country on his return thither; no means were uſed to inſtruct him in agriculture, or any mechanical art or uſeful manufacture; and, above all, to poſſeſs him with a moral ſenſe; to teach him the exalted ideas of virtue, and the ſublime principles of revealed religion. After a ſtay of two years in England, and having been inoculated for the ſmall-pox, he embarked with Captain Cook, on board the Reſolution, on his return home, loaded with a profuſion of preſents. At parting with his friends here, his tears flowed plentifully, and his whole behaviour beſpoke him to be ſincerely affected at the ſeparation: but though he lived in the midſt of amuſements during his reſidence in England, his return to his native country was always in his thoughts; and tho' he was not impatient to go, he expreſſed a ſatisfaction as the time of his return approached.

OTALGIA, the EAR-ACH, in medicine. See there n° 314. and p. 4869.

OTIS, in ornithology, a genus of birds belonging to the order of grallæ. There are four ſpecies, principally diſtinguiſhed by their colour. One of the ſpecies, the tarda, or buſtard, is the largeſt of the Britiſh land-fowl; the male at a medium weighing 25 pounds; there are inſtances of ſome very old ones weighing 27: The breadth nine feet; the length near four. Beſides the ſize and difference of colour, the male is diſtinguiſhed from the female by a tuft of feathers about five inches long on each ſide of the lower mandible. Its head and neck are aſh-coloured: the back is barred tranſverſely with black and bright ruſt-colour: the greater quill-feathers are black: the belly white: the tail is marked with broad red and black bars, and conſiſts of twenty feathers: the legs duſky.

The female is about half the ſize of the male: the crown of the head is of a deep orange, traverſed with black lines; the reſt of the head is brown. The lower part of the fore-ſide of the neck is aſh-coloured: in other reſpects it reſembles the male, only the colours of the back and wings are far more dull.

Theſe birds inhabit moſt of the open countries of the ſouth and eaſt parts of this iſland, from Dorſetſhire, as far as the Wolds in Yorkſhire. They are exceeding ſhy, and difficult to be ſhot; run very faſt, and when on the wing can fly, though ſlowly, many miles without reſting. It is ſaid that they take flight with difficulty, and are ſometimes rnn down with grehounds. They keep near their old haunts, ſeldom wandering above 20 or 30 miles. Their food is corn and other vegetables, and thoſe large earth-worms that appear in great quantities on the Downs before ſun-riſing in the ſummer. Theſe are replete with moiſture, anſwer the purpoſe of liquids, and enable them to live long without drinking on thoſe extenſive and dry tracts. Beſides this, nature hath given the males an admirable magazine for their ſecurity againſt draught, being a pouch, whoſe entrance lies immediately under the tongue, and which is capable of holding near ſeven quarts; and this they probably fill with water, to ſupply the hen when ſitting, or the young before they can fly. Buſtards lay only two eggs, of the ſize of thoſe of a gooſe, of a pale olive-brown, marked with ſpots of a dark colour; they make no neſt, only ſcrape a hole in the gronnd. In autumn they are (in Wiltſhire) generally found in large turnep-fields near the Downs, and in flocks of 50 or more.

Plate CCXXXIII

OTRANTO, or Terra d'Otranto, a province of Italy in the kingdom of Naples; bounded on the north by the Terra di Bari and by the gulph of Venice, on the eaſt by the ſame gulph, and on the ſouth and weſt by a great bay which is between that and the Baſilicata. It is a mountainous country, abounding in figs, olives, and wine. It is often viſited by locuſts, and by Algerine pirates, who carry off all the people they can catch into ſlavery. But to keep them off, there are a great many forts on the coaſts.

Otranto, a city of Italy, in the kingdom of Naples, and capital of the province of the ſame name, with a commodious harbour, an archbiſhop's ſee, and a ſtrong citadel where the archbiſhop reſides. It was taken by the Turks in 1480, who did a great deal of miſchief: and it has frequently ſuffered much from the Algerines. It is a large handſome place, ſeated on the gulph of Venice, in E. Long. 18. 35. N. Lat. 40. 21.

OTWAY (Thomas) an eminent tragic poet, was the ſon of Mr Humphry Otway, rector of Wolbeding in Suſſex; and was born at Trottin in that county, on the 3d of March 1651. He was educated at Oxford; when, leaving the univerſity without a degree, he retired to London, where he commenced player, but with indifferent ſucceſs. However, the ſprightlineſs of his converſation gained him the favour of Charles Fitz-Charles earl of Plymouth, who procured him a cornet's commiſſion in one of the new-raiſed regiments ſent into Flanders; but he returned from thence in very neceſſitous circumſtances, and applied himſelf again to writing for the ſtage. In comedy he has been deemed too licentious; which, however, was no great objection to his pieces in the profligate days of Charles II. But, in tragedy, few Engliſh poets have ever equalled him; and perhaps none ever excelled him in touching the paſſions, particularly the tender paſſion. There is generally ſomething familiar and domeſtic in the fable of his tragedies, and there is amazing energy in his expreſſion.—The heart that doth not melt at the diſtreſſes of his Orphan muſt be hard indeed! But though Otway poſſeſſed in ſo eminent a degree the rare talent of writing to the heart, yet he was not very favourably regarded by ſome of his cotemporary poets, nor was he always ſucceſsful in his dramatic compoſitions. After experiencing many reverſes of fortune in regard to his circumſtances, but generally changing for the worſe, he at laſt died wretchedly in a public houſe on Tower-hill; whither, it is ſuppoſed, he had retired in order to avoid the preſſure of his creditors. Some have ſaid, that downright hunger compelling him to fall too eagerly on a piece of bread, of which he had been for ſome time in want, the firſt mouthful choaked him, and inſtantly put a period to his days.—His dramatic writings are nine in number; the moſt admired of which are, *The Orphan*, and *Venice Preſerved*. He had alſo made ſome tranſlations, and wrote ſeveral miſcellaneous poems. His whole works are printed in two pocket-volumes.

OVAL, an oblong curvilinear figure, otherwiſe called *ellipſis*. See Ellipsis. However, the proper oval, or egg-ſhape, differs conſiderably from that of the ellipſis, being an irregular figure, narrower at one end than at another; whereas the ellipſis, or mathematical oval, is equally broad at each end: though, it muſt be owned, theſe two are commonly confounded together; even geometricians calling the oval a *falſe ellipſis*.

OVARY, in anatomy, that part of a female animal wherein the ova or eggs are formed or lodged. See Anatomy, nº 372, m.

OVARIUM, in botany, a name by which botaniſts, who are fond of aſſimilating the animal and vegetable kingdoms, have diſtinguiſhed the germen or ſeed-bud, as containing the rudiments of the future ſeed.

OVATION, in the Roman antiquity, a leſſer triumph, allowed to commanders for victories won without the effuſion of blood; or for defeating a mean and inconſiderable enemy. The ſhow generally began at the Albanian mountain, whence the general with his retinue made his entry into the city on foot, with many flutes or pipes ſounding in concert as he paſſed along, and wearing a garland of myrtle as a token of peace. The term ovation, according to Servius, is derived from *ovis*, a ſheep; becauſe on this occaſion the conqueror ſacrificed a ſheep, as in triumph he ſacrificed a bull.

OUDENARDE, a rich and ſtrong town of Auſtrian Flanders, in the middle of which there is a conſiderable fort. The river Scheld runs acroſs this place with its environs, whoſe ſoil is very fertile, and forms a conſiderable chatellany. They have here a manufacture of very fine linen and curious tapeſtry. This town was beſieged by the French in 1708; but they were obliged to raiſe the ſiege by the duke of Marlborough and prince Eugene, who entirely defeated their army, killing 3000 on the ſpot, and taking 7000 priſoners. E. Long. 3. 42. N. Lat. 50. 49.

OVERBURY (Sir Thomas), a learned and worthy Engliſh gentleman, was born in 1581; and ſtudied at Queen's college, Oxford, after which he removed to the Middle-temple London. He afterwards travelled for ſome time, and returned a moſt accompliſhed perſon;

ſon; when he contracted an intimate acquantance with Sir Robert Carr, knight of the bath, who being ſoon after taken into his majeſty's favour, had Mr Overbury knighted at Greenwich. Sir Thomas perceiving the familiarity which ſubſiſted between his patron Carr, now made viſcount Rocheſter, and the lady Frances, the wife of Robert earl of Eſſex, was ſo much diſpleaſed at it, that he endeavoured to diſſuade him from keeping her company, and from proceeding in the baſe deſign he had formed of having her firſt divorced from her huſband, and then marrying her. The viſcount, reſenting this honeſt advice, told what he had ſaid to the lady, who was as remarkable for her wickedneſs as for her beauty; on which they immediately reſolved on his deſtruction. About this time, the king wanting to ſend an ambaſſador abroad, the viſcount recommended Sir Thomas Overbury. His majeſty approving the choice, the viſcount imparted the king's intentions to Sir Thomas; but, under a treacherous ſhew of friendſhip, diſſuaded him from accepting of that employment, as it might hinder him from a better way of advancement; promiſing that he would prevent his majeſty from being diſpleaſed at his refuſal. The viſcount then went to the king, and artfully incenſing his majeſty againſt Sir Thomas for refuſing to obey his commands, that gentleman was committed to the tower for his contempt, on the 21ſt of April 1613, where he continued till he was diſpatched by poiſon on the 15th of September following, and his body was interred in the tower-chapel the ſame day. About two years after, the whole contrivance of his death was diſcovered. On this ſeveral perſons were condemned and executed; but tho' Carr, earl of Somerſet, and the lady Frances his counteſs, were condemned to death for contriving the murder, and hiring the perſons who were concerned in it, the king only baniſhed them from court, and afterwards pardoned them. Sir Thomas Overbury wrote ſeveral poems, &c. and an account his travels.

OVEN, a kind of domeſtic furnace, uſed for baking bread, pies, tarts, &c. of a circular ſtructure, with a very low roof, well lined, both on the top, bottom, and ſides, with ſtone; it has a ſmall entrance in the front, which is exactly fitted by a kind of door, which being clapped to the mouth of the oven confines the heat, while bread, pies, or puddings, are baking. Over this, paſtry-cooks, &c. have another oven built much in the ſame manner, which is uſed for ſuch things as require a leſs degree of heat. Ovens are heated by burning dry wood, faggots, &c. in them, till all the parts are equally hot.

OVER-HAULING, the act of opening and extending the ſeveral parts of a tackle, or other aſſemblage of ropes, communicating with blocks or dead eyes. It is uſed to remove thoſe blocks to a ſufficient diſtance from each other, that they may be again placed in a ſtate of action, ſo as to produce the effect required.

Over-*Hauling*, is alſo vulgarly expreſſed of an examination or inſpection into the condition of a perſon or thing.

Over-*Rake*, among ſeamen: When a ſhip riding at anchor ſo overbeats herſelf into an high ſea, that ſhe is waſhed by the waves breaking in upon her, they ſay the waves over-rake her.

Over-*Reach*, in farriery. See there, § xl. 2.

OVERSMAN, in Scots law, a perſon appointed by arbiters, or by the parties ſubmitters, to determine the matter ſubmitted, in caſe the parties diſagree in their opinion.

OVERT, the ſame with "open:" thus an overt act ſignifies an act which, in law, muſt be clearly proved; and ſuch is to be alleged in every indictment for high treaſon.

OVERTURE, or Ouverture, opening or preluding: a term uſed for the ſolemnities at the beginning of a public act or ceremony; an opera, tragedy, comedy, concert of muſic, &c.—The overture of the theatre or ſcene, is a piece of muſic uſually ending with a fugue; the overture of a jubilee is a general proceſſion, &c.

OVERYSSEL, one of the Seven United Provinces; bounded on the eaſt by the biſhopric of Munſter, on the north by Frieſland and the territority of Groningen, on the weſt by the river Yſſel, and on the ſouth by the county of Zutphen and the biſhopric of Munſter. It is divided into three diſtinct parts; which are, the territories of Drenſe, Twente, and Salland. There are many moraſſes in this province, and but few inhabitants, in compariſon of the reſt. Its greateſt riches conſiſt in turfs; which are dug up here, and ſent to the neighbouring provinces, particularly Holland.

OVIEDO, a town of Spain, and capital of Aſturias d'Oviedo, with a biſhop's ſee, and an univerſity; ſeated at the confluence of the rivers Ove and Deva, which form the Aſta, 50 miles north-weſt of Leon, and 208 north-weſt of Madrid. W. Long. 5. 47. N. Lat. 43. 23.

OUGHTRED (William), an eminent mathematician, was born at Eton in 1573, and educated in the ſchool there, whence he was elected to king's college in Cambridge, of which he afterwards became fellow. Having received holy orders, he left the univerſity about the year 1603, and was preſented to the rectory of Aldbury, near Guildford in Surry; and about the year 1628, was appointed by the earl of Arundel to inſtruct his ſon in the mathematics. He kept a correſpondence by letters with ſome of the moſt eminent ſcholars of his time, upon mathematical ſubjects; and the moſt celebrated mathematicians of that age owed moſt of their ſkill to him, whoſe houſe was full of young gentlemen that came from all parts to receive his inſtruction. It is ſaid, that, upon hearing the news of the vote at Weſtminſter for the reſtoration of king Charles II. he expired in a ſudden tranſport of joy, aged 88. He wrote, 1. *Clavis Mathematica;* which was afterwards publiſhed in Engliſh. 2. A deſcription of the double horizontal dial. 3. *Opuſcula Mathematica;* and ſeveral other works. He left alſo behind him a great number of papers upon mathematical ſubjects, which are now in the muſeum of William Jones, Eſq; F. R. S.

OVID, or *Publius* Ovidius *Naſo*, a celebrated Latin poet of the Auguſtan age, was a Roman knight, born at Sulmo, in the 43d year before the Chriſtian æra. He ſtudied rhetoric under Arelius Fuſcus, and for ſome time frequented the bar; but was afterwards diſguſted with that ſtudy, and applied himſelf entirely to poetry. Ovid, after having obtained the eſteem of Auguſtus, incurred his diſpleaſure; and was baniſhed to Tomos, a city on the Pontus Euxinus, near the mouth of the Danube, when he was 50 years of age. Several writers have ſaid that he was baniſhed for being one of the lovers of Julia the daughter of Auguſtus, whom, according to them, he mentions under the name of *Corinna*; but Aldus Minutius has plainly refuted this notion. Ovid himſelf ſays, that his being ſent into exile was occaſioned by the licentiouſneſs of his verſes, and his having ſeen by accident and involuntarily ſomething which he ought not to have ſeen. He in vain made uſe of all the turns of his wit to appeaſe the emperor; but not all his addreſs could procure his being again received into favour. He died in the country of the Getæ, aged 57, after having ſpent ſeven years in his baniſhment. His works and their character are well known.

OVILIA, or SEPTA, in ancient Rome, a place in the Campus Martius, at firſt railed in like a ſheep-pen, whence its name. Afterwards it was mounted with marble, and beautified with walks and galleries, as alſo with a tribunal, or ſeat of juſtice. Within this precinct or incloſure, the people were called to give their ſuffrages for the election of magiſtrates. The aſcent into the ovilia was not by ſtairs, but by pontes, or narrow boards, laid there for the occaſion; on which account *de ponte dejici*, ſignified " to be deprived of the privilege of voting;" and perſons thus dealt with were called *depontani*.

OVIPAROUS, a term applied to ſuch animals as bring forth their young from eggs; as birds, inſects, &c.

OVIS, the SHEEP, in zoology, a genus of the mammalia claſs, and of the order of pecora; the characters of which are theſe: The horns are concave, turned backwards, and full of wrinkles; there are eight fore-teeth in the under-jaw, and no dog-teeth. The ſpecies are,

1. Aries, or ram and ewe, the horns of which are ſhaped like a half-moon, and compreſſed.

The ſheep, unqueſtionably a mild and gentle creature, is alſo repreſented by Buffon as the moſt ſtupid, defenceleſs, and timid of all quadrupeds; inſomuch that, without the aſſiſtance of man, it could never, he thinks, have ſubſiſted or continued its ſpecies in a wild ſtate.

Buffon's Nat. Hiſt. Vol. III. p. 463.

" The female is abſolutely devoid of every art and of every mean of defence. The arms of the ram are feeble and awkward. His courage is only a kind of petulance, which is uſeleſs to himſelf, incommodious to his neighbours, and is totally deſtroyed by caſtration. The wedder is ſtill more timid than the ſheep. It is fear alone that makes ſheep ſo frequently aſſemble in troops: upon the ſmalleſt unuſual noiſe, they run cloſe together; and theſe alarms are always accompanied with the greateſt ſtupidity. They know not how to fly from danger, and ſeem not even to be conſcious of the hazard and inconvenience of their ſituation. Wherever they are, there they remain obſtinately fixed; and neither rain nor ſnow can make them quit their ſtation. To force them to move or to change their route, they muſt be provided with a chief, who is learned to begin the march: the motions of this chief are followed, ſtep by ſtep, by the reſt of the flock. But the chief himſelf would alſo continue immoveable, if he were not puſhed off by the ſhepherd, or by his dog, an animal which perpetually watches over their ſafety, which defends, directs, ſeparates, aſſembles, and, in a word, communicates to them every movement neceſſary to their preſervation.

" Of all quadrupeds, therefore, ſheep are the moſt ſtupid, and derive the ſmalleſt reſources from inſtinct. The goat, who ſo greatly reſembles the ſheep in other reſpects, is endowed with much more ſagacity. He knows how to conduct himſelf on every emergency: he avoids danger with dexterity, and is eaſily reconciled to new objects. But the ſheep knows neither how to fly nor to attack: however imminent her danger, ſhe comes not to man for aſſiſtance ſo willingly as the goat; and, to complete the picture of timidity and want of ſentiment, ſhe allows her lamb to be carried off, without attempting to defend it, or ſhowing any marks of reſentment. Her grief is not even expreſſed by any cry different from that of ordinary bleating."

But the annotator upon this article in the Edinburgh tranſlation of Buffon, denies the above to be the natural character of the animal. " All tame animals," he obſerves, " loſe a portion of that ſagacity, dexterity, and courage, which they are obliged to employ againſt their enemies in a wild ſtate; becauſe they have been long accuſtomed to rely upon the protection of man. Sheep, when enſlaved by men, tremble at the voice of the ſhepherd or his dog. But, on thoſe extenſive mountains where they are allowed to range without controul, and where they ſeldom depend on the aid of the ſhepherd, they aſſume a very different mode of behaviour. In this ſituation, a ram or a wedder boldly attacks a ſingle dog, and often comes off victorious. But when the danger is of a more alarming nature, like man, they truſt not to the proweſs of individuals, but have recourſe to the collected ſtrength of the whole flock. On ſuch occaſions, they draw up into one compact body; they place the young and the females in the centre; and the ſtrongeſt males take the foremoſt ranks, keeping cloſe by each others ſides. Thus an armed front is preſented on all quarters, and cannot be attacked without the greateſt hazard of deſtruction. In this manner they wait, with firmneſs and intrepidity, the approach of the enemy. Nor does their courage fail them in the moment of attack. For, if the aggreſſor advances within a few yards of the line, the ram darts upon him with ſuch impetuoſity, as lays him dead at their feet, unleſs he ſaves himſelf by flight. Againſt the attacks of ſingle dogs, or foxes, they are, when in this ſituation, perfectly ſecure. Beſides, a ram, regardleſs of danger, often engages a bull, and never fails to conquer him; for the bull, by lowering his head, without being ſenſible of his defenceleſs condition, receives between his horns the ſtroke of the ram, which uſually brings him to the ground.

Ibid. p. 464. *notes.*

" In the ſelection of food, few animals diſcover greater ſagacity than the ſheep; nor does any domeſtic animal ſhow more dexterity and cunning in its attempts to elude the vigilance of the ſhepherd, and to ſteal ſuch delicacies as are agreeable to its palate. When perfectly tamed, and rendered domeſtic, the ſportive gambols and troubleſome tricks of the animal, are too well known to require any deſcription."

As to the accuſations contained in the latter part of the character above quoted; every perſon, it is obſerved, who has attended to thoſe animals, at leaſt in this country, muſt know that they are not altogether juſt.

Ibid. p. 466. *notes.* “Individuals in a ſtate of ſubjection, ſeem to have no idea of reſiſting the attacks of an enemy. But they ſoon learn that their protection lies in the ſhepherd or his dog: for, when it becomes neceſſary, in Britain, to watch the folds, in order to prevent aſſaults from foxes or dogs, upon the firſt alarm the whole flock run with violence to the place where the watchmen are ſtationed; ſo that, when they chance to ſleep, they are often hurt by the ſheep trampling upon them. On other occaſions, they never chooſe to make a very cloſe approach either to men or dogs; but the ſenſe of immediate danger makes them forget their uſual timidity, and their ſagacity teaches them where their ſafety lies. When the female is robbed of her lamb, ſhe bleats in a manner that ſtrongly marks the anguiſh ſhe feels. In the eagerneſs of her ſearch, her eye-balls ſeem to ſtart from their ſockets; and her irregular and diſtracted motions, joined to the violence and conſtancy of her bleatings, are evident indications of the moſt pungent grief.”

But whatever may be its manners or its mental qualities, this animal is of the moſt extenſive utility to man. We are clothed by its fleece. The fleſh is a delicate and wholeſome food. The ſkin, dreſſed, forms different parts of our apparel; and is uſed for covers of books. The entrails, properly prepared and twiſted, ſerve for ſtrings for various muſical inſtruments. The bones calcined (like other bones in general), form materials for teſts for the refiner. The milk is thicker than that of cows, and conſequently yields a greater quantity of butter and cheeſe; and in ſome places is ſo rich, that it will not produce the cheeſe without a mixture of water to make it part from the whey. The dung is a remarkably rich manure; inſomuch that the folding of ſheep is become too uſeful a branch of huſbandry for the farmer to neglect. Nature, in ſhort, has given this animal nothing that does not redound to our benefit.

The ram is capable of generation at the age of 18 months; and the ewe can be impregnated when a year old. One ram is ſufficient for 40 or or 40 ewes. He ought to be large and well proportioned; his head ſhould be thick and ſtrong, his front wide, his eyes black, his noſe flat, his neck thick, his body long and tall, his teſticles maſſy, and his tail long. White is the beſt colour for a ram. The ewes whoſe wool is moſt plentiful, buſhy, long, ſoft, and white, are moſt proper for breeders, eſpecially when at the ſame time they are of a large ſize, have a thick neck, and move nimbly.

In this climate ewes fed in good paſtures admit the ram in July or Auguſt; but September or October are the months when the greateſt part of our ewes, if left to nature, take the ram. They go with young about five months, and generally bring forth but one at a time, though frequently two: in warm climates, they may bring forth twice in a year; but in Britain, France, and moſt parts of Europe, only once. They give milk plentifully for ſeven or eight months. They live from 10 to 12 years: they are capable of bringing forth as long as they live, when properly managed; but are generally old and uſeleſs at the age of ſeven or eight years. The ram, who lives 12 or 14 years, becomes unfit for propagating when eight years old.

When the male lambs are not intended to be kept for propagation, but fattened for food, they ought to be caſtrated at the age of five or ſix months. This operation is performed two ways: in the one, an inciſion is made, and the teſticles taken out; in the other, a ligature is tied tight round the ſcrotum, above the teſticles, which ſoon deſtroys the veſſels which nouriſh them. After caſtration they are called *wedders*.

The ram, ewe, and wedder, when one year old, loſe the two foreteeth of the under jaw; ſix months afterwards, they loſe the two foreteeth next to theſe; and at the age of three years, the teeth are all replaced. The age of a ram may likewiſe be diſcovered by their horns, which always appear the firſt year, and frequently as ſoon as they are brought forth. Theſe horns uniformly acquire an additional ring every year, as long as the creature lives. The ewes commonly have no horns, but a kind of long protuberances in place of them: however, ſome of them have two, and ſome four horns.

In Spain, and the ſouthern parts of Europe, the flocks are kept in ſhades or ſtables during the night: but in Britain, where there is now no danger from wolves, they are allowed to remain without, both night and day; which makes the animals more healthy, and their fleſh a more wholeſome food. Dry and mountainous grounds, where thyme and ſheep's feſcue graſs abound, are the beſt for the paſturing ſheep.

The ſheep is ſubject to many diſeaſes: ſome ariſe from inſects which depoſit their eggs in different parts of the animal: others are cauſed by their being kept in wet paſtures; for as the ſheep requires but little drink, it is naturally fond of a dry ſoil. The dropſy, vertigo, (the *pendro* of the Welſh), the pthiſis, jaundice, and worms in the liver, annually make great havoc among our flocks: for the firſt diſeaſe, the ſhepherd finds a remedy by turning the infected into fields of broom; which plant has been alſo found to be very efficacious in the ſame diſorder among the human ſpecies.—The ſheep is alſo infeſted by different ſorts of inſects: like the horſe, it has its peculiar œſtrus or gadfly, which depoſits its eggs above the noſe in the frontal ſinuſes; when thoſe turn into maggots, they become exceſſive painful, and cauſe thoſe violent agitations that we ſo often ſee the animal in. The French ſhepherds make a common practice of eaſing the ſheep, by trepanning and taking out the maggot; this practice is ſometimes uſed by the Engliſh ſhepherds, but not always with the ſame ſucceſs. Beſides theſe inſects, the ſheep is troubled with a kind of tick and louſe, which magpies and ſtarlings contribute to eaſe it of, by lighting on its back, and picking the inſects off.

2. The guineenſis, or Guinea ſheep, has pendulous ears, lax hairy dew lips, and a prominence on the hind part of the head. The wool is ſhort, like that of a goat. It is a native of Guinea.

3. The ſtrepſiceros, or Cretan ſheep, has ſtrait carinated horns, twiſted in a ſpiral manner. It is a native of mount Iola.

OUNCE, a little weight, the 16th part of a pound avoirdupoiſe, and the 12th part of a pound Troy. The word is derived from the Latin, *uncia*, " the twelfth part of any whole," called *as*; particularly in geometrical meaſures, an inch, or the 12th part of a foot. See Inch and As.

Ounce, in zoology. See Leo.

OVOLO, or Ovum, in architecture, a round moulding, whoſe profile, or ſweep, in the Ionic and Compoſite capitals, is uſually a quadrant of a circle: whence it is alſo commonly called the *quarter round*. It is uſually cut with repreſentations of eggs and arrow-heads or anchors placed alternately.

OUSE, a river which riſes in the north of Yorkſhire, runs ſouth-eaſt by York, Cawood, and Selby, and falls into the Humber to the weſt of St Cay.

Ouse, a river which riſes near Fitwell in Oxfordſhire, and proceeds to Buckingham, Stony-Stratford, and Newport-Pagnel, in Buckinghamſhire; from thence it proceeds to Bedford, and, turning north-eaſt, it paſſes on to Huntingdon and Ely, till at length it arrives at Lynn-Regis in Norfolk, and falls into the ſea.

OUSTIOUG, a town of the Ruſſian empire, and capital of a province of the ſame name, with an archbiſhop's ſee and a caſtle; ſeated on the river Suchana, over-againſt the mouth of the Jug, in E. Long. 43. 25. N. Lat. 61. 48.

Oustioug, a province of the Ruſſian empire, bounded on the north by Dwina, on the eaſt by the foreſt of Zirani, on the ſouth by Wologda, and on the weſt by Cargapol and Waga. It is divided into two parts by the river Suchana; is full of foreſts; and the rivers yield plenty of fiſh, which the inhabitants dry in the ſun, and which make their principal nouriſhment.

OUT-posts, in a military ſenſe, a body of men poſted beyond the grand guard; called *out poſts*, as being the rounds or limits of the camp.

OUTLAW, ſignifies one that is deprived of the benefit of the law, and therefore held to be out of the king's protection. See the next article.

OUTLAWRY, is where a perſon is outlawed, and o that account loſes the benefit of a ſubject.—The proceſs of outlawry lies in indictments of treaſon or felony, and alſo of treſpaſs *vi et armis*, conſpiracy, &c. And by ſtatute, perſons may be outlawed in many civil actions; as debt, caſe, covenant, &c.

OVUM anguinum. See Anguinum.

OUTWORKS, in fortification, all thoſe works made without-ſide the ditch of a fortified place, to cover and defend it. See Fortification.

OUZEL, in ornithology; a ſpecies of Motacilla.

OWEN (Thomas), a judge of the common-pleas, was the ſon of Richard Owen, Eſq; of Condover in Shropſhire, and educated at Oxford; whether in Chriſt-church college, or Broadgate hall, is not determined. Having taken a degree in arts, he left the univerſity, and entered himſelf of Lincoln's inn in London, where in proceſs of time he became an eminent counſellor. In 1583 he was elected Lent-reader to that ſociety. In 1590 he was made ſerjeant at law, and queen's ſerjeant ſoon after. He arrived at length at the dignity of judge of the common-pleas; which office he is ſaid to have executed, during five years, with great abilities and integrity. He died in 1598; and was buried on the ſouth ſide of the choir in Weſtminſter abbey, where a monument was erected to his memory. He had the reputation of a learned man, and a patron of literature. He was the author of " Reports in the common pleas, wherein are many choice caſes, moſt of them throughly argued by the learned ſerjeants, and after argued and reſolved by the grave judges of thoſe times, with many caſes wherein the difference of the year-books are reconciled and explained." Lond. 1656, fol.

Owen (Dr John), an eminent and learned diſſenting miniſter, was born in 1616, at Hadham, in Oxfordſhire, of which place his father was vicar. He made ſuch ſurpriſing proficiency in learning, that at twelve years of age he was admitted into Queen's College, Oxford, and in 1635 was made maſter of arts: but ſoon after, diſapproving the new regulations made by archbiſhop Laud their chancellor, with which he refuſed to comply, he was obliged, in 1637, to leave the college; when taking orders, he became chaplain to Sir Robert Dormer of Aſcot in Oxfordſhire, and was at the ſame time tutor to his eldeſt ſon. He was afterwards chaplain to John Lord Lovelace of Hurley, in Berkſhire; when the civil war breaking out, he openly avowed the cauſe of the parliament; which was ſo reſented by an uncle, who had intended to leave him his eſtate, that he diſcarded him, and left it to another. Yet though Lord Lovelace ſided with the king, he treated his chaplain with great civility: but on his going to join the royal army, Mr Owen went to London, and ſoon after joined the non-conformiſts. In 1642 he publiſhed his book, intitled, *A diſplay of Arminianiſm*, which laid the foundation of his future advancement: for the committee for purging the church of ſcandalous miniſters were ſo pleaſed with it, that Mr White their chairman ſent him a preſentation of the living of Fordham in Eſſex: but when he had been there about a year and a half, the patron hearing that the ſequeſtered incumbent was dead, preſented another to the living; upon which the Earl of Warwick gave Mr Owen the living of Coggeſhal. He had not, however, been long at that town before he left the Preſbyterians; and, joining the independants, formed a church there. He was now ſent for ſeveral times to preach before the parliament; and among the reſt on the 28th of February 1648-9, the day of humiliation for the intended expedition to Ireland. Cromwell, who was preſent at this laſt diſcourſe, and had never heard him before, was extremely pleaſed with it, and deſired his company into Ireland, and that he would reſide in the college of Dublin. This he did; but returned in about half a year. Soon after Cromwell ſent him into Scotland; but he alſo returned from thence after about half a year's ſtay at Edinburgh. He was then promoted to the deanery of Chriſt-church, Oxford; whither he went in 1651; and Cromwell, being now chancellor of the univerſity, nominated him his vice-chancellor. The next year he was created doctor of divinity by diploma. Dr Owen enjoyed the poſt of vice-chancellor five years; during which he behaved with the greateſt moderation: for, though often ſolicited, he never moleſted the meeting of the royaliſts at the houſe of Dr Willis the phyſician, where divine ſervice was performed according to the liturgy of the church of England; and though he was a commiſſioner for ejecting ſcandalous miniſters, he frequently overruled his brethren in favour of thoſe royaliſts who were diſtinguiſhed by their merit. At the death of Cromwell, he was removed from the vice-chancellorſhip;

and at the Reſtoration was ejected from his deanery of Chriſt-church. But he had provided himſelf a comfortable retreat at an eſtate he had purchaſed at Hadham. He now employed himſelf in preaching as often as he had an opportunity, and in writing books; one of which, intitled *Fiat Lux*, falling in the hands of Lord Clarendon, he was ſo pleaſed with it, or (as is ſaid) from policy pretended to be ſo, that he ſent for Dr Owen, and, acknowledging the ſervice he had done by it to the Proteſtant religion, offered to prefer him in the church, if he would conform; but he deſired to be excuſed.—His moderation drew him reſpect from perſons of oppoſite principles; and in the number of his friends were Dr Wilkins biſhop of Cheſter, and Dr Barlow biſhop of London. He died at Ealing in 1683. His works are printed in ſeven volumes folio.

OWL, in ornithology. See Strix.

OWLING, ſo called from its being uſually carried on in the night, is the offence of tranſporting wool or ſheep out of this kingdom, to the detriment of its ſtaple manufacture. This was forbidden at common law, and more particularly by ſtatute 11 Edw. III. c. 1. when the importance of our woollen manufacture was firſt attended to; and there are now many later ſtatutes relating to this offence, the moſt uſeful and principal of which are thoſe enacted in the reign of Queen Elizabeth, and ſince. The ſtatute 8 Eliz. c. 3. makes the tranſportation of live ſheep, or embarking them on board any ſhip, for the firſt offence forfeiture of goods, and impriſonment for a year, and that at the end of the year the left hand ſhall be cut off in ſome public market, and ſhall be there nailed up in the openeſt place; and the ſecond offence is felony. The ſtatutes 12 Car. II. c. 32. and 7 & 8 Will. III. c. 28. make the exportation of wool, ſheep, or fuller's earth, liable to pecuniary penalties, and the forfeiture of the intereſt of the ſhip and cargo by the owners, if privy; and confiſcation of goods, and three years impriſonment to the maſter and all the mariners. And the ſtatute 4 Geo. I. c. 11. (amended and farther enforced by 12 Geo. II. c. 21. and 19 Geo. II. c. 34.) makes it tranſportation for ſeven years, if the penalties be not paid.

OXALIS, woodsorrel; a genus of the pentagynia order, belonging to the decandria claſs of plants. There are ſeven ſpecies; of which the only remarkable is the acetoſella, or common wood-ſorrel. This grows naturally in moiſt ſhady woods, and at the ſides of hedges in many parts of Britain, ſo is but ſeldom admitted into gardens. The roots are compoſed of many ſcaly joints, which propogate in great plenty. The leaves ariſe immediately from the roots upon ſingle long footſtalks, and are compoſed of three heart-ſhaped lobes. They are gratefully acid, and of uſe in the ſcurvy and other putrid diſorders.

OXFORD, the capital of a county of the ſame name in England, celebrated for its univerſity, and pleaſantly ſituated in a plain, with a fine fruitful country all around. The compoſition of the name is obvious. In the Britiſh times it ſeems to have been a place of ſtudy; but in the Saxon æra, it was noted only for a religious houſe dedicated to St Frideſwide, till Alfred built three colleges, one for grammarians, another for philoſophers, and a third for divines. Learning continued to flouriſh till the city was ſacked and burnt by the Danes in the reign of Etheldred; and after that, Harold, ſurnamed *Harefoot*, treated it with great ſeverity upon ſome provocation he had received. It ſeems to have been beſieged and taken by William the Conqueror, and to have been deſerted by the learned from that time till about the year 1129, when one Robert Pulein began to read lectures in divinity: and ſuch was the reſort of ſtudents to it, that in the reign of King John there were not fewer than three thouſand. Robert d'Oily, a Norman, to whom William the Conqueror had given the greateſt part of it, built a caſtle on the weſt ſide in 1071; and he is alſo ſuppoſed to have ſurrounded it with walls. In a palace built by Henry I. was born Richard I. commonly called *Cœur de Lion*. About the tenth of King John, there happened a quarrel between the citizens and ſtudents; in conſequence of which many of the latter quitted it, but returned again a few years afterwards. Here Henry III. held a parliament to ſettle the differences betwixt him and his barons; when he confirmed the privileges granted to the univerſity by his predeceſſors, and added others of his own. In this reign the ſtudents are ſaid to have been 30,000; who were all excommunicated by the pope for ſome rudeneſs to his legate. In Edward III's time, they were ſplit into two factions, called the *northern* and *ſouthern men*; a diviſion which was attended with many diſorders and much violence, but in a ſhort time concord and harmony again prevailed. As colleges began about this time to be founded and endowed, we ſhall here preſent our readers with a liſt of them, together with the time when, and the perſons by whom, they were founded.

Colleges.	*Founders.*	*Kings reigns.*
Univerſity.	King Alfred.	Alfred.
Baliol.	Sir John Baliol, father to the king of Scots.	Henry III.
Merton.	Walter Merton, lord chancellor and biſhop of Rocheſter.	Edward I.
Oriel.	Edward the Second.	Edw. II.
Exeter.	Walter Stapleton, biſhop.	Edw. II.
Queen's.	Robert Eglesfield, B. D.	Edw. III.
New College.	William of Wickham, biſhop of Wincheſter, lord chancellor.	Edw. III.
Lincoln.	Richard Fleming, biſhop of Lincoln.	Henry VI.
All-Souls.	Hugh Chicheley, archbiſhop of Canterbury.	Henry VI.
Magdalen.	William Wainfleet, biſhop of Wincheſter, lord chancellor.	Henry VI.
Brazen-Noſe.	William Smith, biſhop of Lincoln, and Richard Sutton, Eſq;	Hen. VIII.
Corpus-Chriſti.	Richard Fox, biſhop of Wincheſter, and lord privy-ſeal.	Hen. VIII.
Chriſt-Church.	Henry VIII.	Hen. VIII.
Trinity.	Sir Thomas Pope.	Mary.
St John Baptiſt,	Sir Thomas White, merchant of London.	Mary.
Jeſus.	Queen Elizabeth.	Eliſabeth.
Wadham.	Nicholas and Dorothy Wadham.	James I.
Pembroke.	Thomas Tiſdale, Eſq; and Dr Richard Whitwick.	James I.

Worceſter was called *Glouceſter-hall* till lately, that it was endowed by Sir Thomas Coke, and made collegiate.

Hartford was *Hart-hall* till 1740, that it was erected into a college.

All theſe are richly endowed, and have fine gardens, libraries, chapels, &c. The halls in which the ſtudents maintain themſelves, except a few that have exhibitions, are theſe: St Edmund's, belonging to Queen's college; Magdalen, to Magdalen college; St Alban's ban's, to Merton; St Mary's, to Oriel; New-Inn, to New-College. Several perſons have been great benefactors to particular colleges, as Dr Ratcliffe to Univerſity-college; colonel Codrington and Dr Clarke, to All-ſouls; queen Caroline, to Queen's; the before-mentioned Dr Clarke and Mrs Eaton, to Worceſter; Dr Wake, archbiſhop of Canterbury, to Chriſt-church. The moſt conſiderable of theſe colleges are Magdalen's and Chriſt-Church, which are as noble foundations as any in the world. The church of the latter is the cathedral, and has a dean, eight canons, eight chaplains, eight ſinging men, eight choiriſters, a teacher of muſic, and an organiſt. Each of the colleges has its viſitor appointed by its ſtatues, except Chriſt-Church, which is ſubject to the viſitation of the Sovereign alone. The other remarkable buildings belonging to the univerſity are, firſt, the public ſchools; ſecondly, the Bodleian or public library; thirdly, Ratcliffe's library, a moſt elegant ſtructure, for building and furniſhing which, Dr Ratcliffe left 40,000l.; fourthly, the theatre, built by Sheldon, archbiſhop of Canterbury; fifthly, the muſeum, in which is an elaboratory and a repoſitory for natural and artificial rarities and antiquities; ſixthly, the Clarendon printing-houſe, ſo called, becauſe it was built partly with the money ariſing to the univerſity by the ſale of Lord Clarendon's hiſtory. To the ſouth of Magdalen college lies the phyſic garden, inſtituted by the Earl of Danby, and much improved by Dr Sherrard. It contains five acres, in which is a complete ſeries of ſuch plants as grow naturally, diſpoſed in their reſpective claſſes; together with two neat and convenient green-houſes, ſtocked with a valuable collection of exotics, and a hot-houſe, where various plants brought from the warmer climates are raiſed. The whole body of the univerſity, including profeſſors, fellows, and ſtudents of all ſorts, exceeds 3000. Each college has its particular ſtatutes and rules for its government. There are four terms in the year for public exerciſes, &c. and particular days and hours for public lectures by the ſeveral profeſſors. The univerſity is governed by a chancellor, high-ſteward, vice-chancellor, two proctors, a public orator, a keeper of the archives, a regiſter, three ſquire-beadles, and three yeomen-beadles. As to the city, it has had the ſame privileges granted to it as London, particularly an exemption from toll all over England. It is governed by a mayor, high-ſteward, recorder, four aldermen, eight aſſiſtants, two bailiffs, a town-clerk, two chamberlains, all that have borne the office of bailiff and chamberlain, and twenty-four common-council men: but theſe are ſubject to the chancellor or vice-chancellor of the univerſity in all affairs of moment; and not only the mayor, but the principal citizens, and ſheriff of the county, take an oath to maintain the privileges of the univerſity. The city, including the colleges, is one of the largeſt in England, having thirteen pariſh-churches, beſides the cathedral, well built, clean, and regular. At the entrance of the town from the Woodſtock and Banbury roads, a neat hoſpital hath been lately erected by the truſtees of Dr Ratcliffe's benefaction, out of the ſurplus money remaining after defraying the expence of his library. The male line of the family of Vere, to whom the city had given the title of earl for 500 years, failing in Aubrey de Vere, who was twentieth earl, queen Anne conferred the title upon Robert Harley, a deſcendant of the Veres, in whoſe family it ſtill continues. The chief trade of the city is in malt, conveyed in barges to London.

OXFORDSHIRE, a county of England, bounded on the weſt by Glouceſterſhire; on the ſouth, where it is broadeſt, the river Iſis divides it from Berkſhire; on the eaſt, it is bounded by Buckinghamſhire; and on the north, where it terminates in a narrow point, it has on the one ſide Northamptonſhire, and on the other Warwickſhire. It extends from Cleydon to Caverſham 42 miles in length, and from Cleydon to Farringdon 26 in breadth, making about 130 in circumference; within which are contained one city, 15 market-towns, 280 pariſhes, 14 hundreds, 534,000 acres, and about 120,000 ſouls. The air is ſweet and pleaſant, and the ſoil rich and fertile. The lower parts conſiſt of meadows and corn-fields, and the higher were covered with woods till the civil wars; in which they were ſo entirely deſtroyed, that wood is now extremely ſcarce and dear, except in what is called the chiltern, and ſo is coal; of conſequence fuel bears an exorbitant price. The county is extremely well watered; for beſides the Iſis, Tame, Cherwell, Evenlode, and Windruſh, there is a great number of leſſer rivers and brooks. One of the four great Roman ways paſſes quite through it, entering at the pariſh of Chinner, and going out at that of Goring. There is another leſſer one, that extends between Colnbrook and Wallinford, called *Gremeſdike*. The county ſends nine members to parliament, viz. two for the ſhire, two for the city, two for the univerſity, two for new Woodſtock, and one for Banbury.

OXGANG, or OXGATE, is generally taken, in our old law-books, for 15 acres, or as much ground as a ſingle ox can plough in a year.

OXUCLÆ, in natural hiſtory, the name of a genus of foſſils of the claſs of ſelenitæ, but of the columnar, not the rhomboidal kind. Of this genus there are only two known ſpecies: 1. A fine kind with thin flakes and tranſverſe filaments, found in the clayey banks of the river Nen, near Peterborough in Northamptonſhire; and, 2. A dull kind with thick plates and longitudinal filaments. This is not uncommon in Yorkſhire, and lies ſometimes in a yellow, and ſometimes in a blue clay.

OXUS, or JIHUN, a large river of Aſia, which riſes in the mountains north of India; and running northweſt, through Uſbec Tartary, ſeparates that country from Perſia, and falls into the Caſpian ſea in 44° N. Lat.

OXYCRATE, in pharmacy, a mixture of vinegar and water, proper to aſſuage, cool, and refreſh. The uſual proportion is one ſpoonful of vinegar to five or ſix ſpoonfuls of water.

OXYGLYCU, a ſpecies of drink prepared of the ſweeteſt honey-combs macerated and boiled. The combs, from which all the honey has been expreſſed, are put into a pot with pure water, and boiled till they ſeem to have depoſited all their contained honey in the water. This liquor is to be kept; and, when diluted with cold water, is to be drank in the ſummer-time, in order to remove thirſt.

OXYMEL, in pharmacy, a compoſition of vinegar and honey. See PHARMACY.

OYER, in law-books, ſeems to have been anciently uſed for what is now called *aſſiſes*. See ASSISE.

pound, paid for all goods not particularly rated.

PACOS, in zoology. See Camelus.

PACUVIUS (Marcus), of Brunduſium in Calabria, a tragic poet in high reputation about the year of Rome 600. He was nephew of Ennius; publiſhed ſeveral theatrical pieces, tho' we have only ſome fragments of his poetry remaining; and died at Tarentum at above 90 years of age.

PADAN-ARAM (Bible), literally *the plains of Aram*, or *Syria;* tranſlated by the Seventy, ſimply *Meſopotamia*, or *Moſopotamia*, of Syria; by the Vulgate, *Syriæ;* the Syrians on this and on the other ſide of the Euphrates, not differing remarkably from each other in language and manners, as Joſephus allows.

PADDOC, or Paddoc-*Courſe*, a piece of ground encompaſſed with pales or a wall, and taken out of a park for exhibiting races with gre-hounds, for plates, wagers, or the like.

A paddoc is generally a mile long, and a quarter of a mile broad: at the one end is a little houſe where the dogs are to be entered, and whence they are ſlipped; near which are pens to incloſe two or three deer for the ſport. Along the courſe are ſeveral poſts, viz. the low poſt, which is 160 yards from the dog-houſe and pens; the quarter of a mile poſt, half mile poſt, and pinching poſt; beſides the ditch, which is a place made to receive the deer, and preſerve them from farther purſuit. And near this place are ſeats for the judges choſen to decide the wager.

The keepers, in order to ſlip the dogs fairly, put a falling collar upon each, ſlipped round a ring; and the deer being turned looſe, and put forward by a teazer, as ſoon as he is arrived at the low-poſt, the dog-houſe door is thrown open, and the dogs ſlipped. If now the deer ſwerve ſo much, as that his head is judged nearer the dog-houſe than the ditch before he arrive at the pinching-poſt, it is no match, and muſt be run over again three days after: but if the deer runs ſtraight beyond the pinching-poſt, then that dog which is neareſt when he ſwerves, or is blanched by any accident, wins the match; but if no ſuch ſwerve happens, then the match is won by the dog who firſt leaps the ditch.

PADERBORN, a duchy of Germany in the circle of Weſtphalia, has the county of Lippe on the north and weſt; Heſſe-Caſſel and Waldeck, on the ſouth; and Munſter, with the duchy of Weſtphalia, on the weſt. Its greateſt length from eaſt to weſt is about 40 miles, and its breadth where wideſt 30. Some parts of it yield good paſture, and breed abundance of cattle; but it is not very fruitful in corn. There is a heath called the *Senne* or *Sende*, of great extent, but very barren and deſolate. There are, however, good iron mines in the country, with ſalt and medicinal ſprings, plenty of deer and other game; and it is watered with ſeveral rivers abounding with fiſh, as the Weſer, the Dimer, the Bever, the Nette, the great Emmer, the Lippe, the Alme, and the Pader. It contains 54 pariſhes, in which are 25 market-towns, and 16 monaſteries. The Roman Catholic is the predominant religion of the country, yet there are alſo many Proteſtants in it. The biſhopric was erected by Charlemagne, towards the cloſe of the eighth century; and the cathedral was conſecrated by pope Leo in perſon, anno 796. The biſhop is ſovereign of the country, a prince of the empire, and ſuffragan of the archbiſhop of Mentz. His revenue is about 30,000 pounds a year, and he is able to raiſe 3000 men. In the matricula, his aſſeſſment is 18 horſe and 34 foot, or 352 florins monthly in lieu of them. Towards the charges of the ſovereign courts of the empire, he pays for each term, 162 rix-dollars and 29 kruitzers. The chapter conſiſts of 24 capitular canons, who muſt prove their noble extraction by four deſcents. The arms of the biſhopric are a croſs or, in a field gules. For the government of it, and the adminiſtration of juſtice, there are ſeveral councils and colleges under the biſhop. Here are alſo a hereditary marſhal, ſewer, cupbearer, chamberlain, ſteward, and purveyor. It was in this biſhopric that Quintilius Varus, with the Roman army under his command, was routed by the Germans under Arminius.

Padderborn, the capital of the above biſhopric. It ſtands 40 miles north-weſt of Caſſel, 50 ſouth-eaſt of Munſter, and 60 ſouth-weſt of Hanover; being a large, populous, well built, and well fortified city. Its name is compounded of *pader*, a rivulet, which riſes juſt under the high altar of the cathedral, and *born*, *i. e.* a ſpring. It was one of the Hanſe-towns; and, till 1604, an imperial city. The cathedral is a grand fabric, inferior to few in the empire. There is a gold crucifix in it of 60 pounds weight, preſented by Otho II. The univerſity, of which the Jeſuits have the direction, was founded in 1592, and the walls were built in the beginning of the 11th century. In 1530, an attempt was made to introduce Lutheraniſm; but 16 of the principal citizens who had embraced it were executed, and the reſt obliged to abjure it. Duke Chriſtian of Brunſwic carried off from hence, in 1692, the ſilver images of the 12 apoſtles, and the ſilver coffin of St Lotharius; and had them coined into money, with this inſcription, *God's Friend, the Prieſts Enemy*. The trade of this town, though formerly great, is now inconſiderable; and the inhabitants ſubſiſt moſtly by agriculture, and breeding of cattle. Though the biſhop has a palace in the city, he reſides (when he vouchſafes to viſit this country, which is ſeldom, having other and more valuable benefices) at Neuhaus, ſeven miles off, where he has a magnificent caſtle. Charlemagne, and other emperors, ſometimes reſided here, and held diets of the empire.

PADUA, an ancient, large, and celebrated city of Italy, with an univerſity and a biſhop's ſee. It is alſo capital of the Paduano; but is much leſs conſiderable than it was formerly: for it now contains no more than 30,000 inhabitants, whereas it formerly had 100,000, and many of the houſes are gone to ruin: however, the hall where juſtice is adminiſtered, is a ſuperb ſtructure. The cathedral church, and the college of the univerſity, are in that part called the *Old Town;* and there are piazzas under all the houſes, where perſons may walk without being expoſed to the weather. The garden of the univerſity is curious, on account of the number of plants. Here a ſtudent may take his degrees, let him be of what ſect of Chriſtianity he will; nay, though he ſhould be a Jew or a Turk. The patron of this city is St Anthony, who lies in the cathedral; they have ſuch a veneration for him, that the beggars do not aſk charity in the name of God, but for the love of St Anthony. The Jews live in a diſtinct part of the city; and the neighbouring mountains produce excellent wine and oil, with delicious fruit. It was taken by the Venetians in 1706. It is ſeated on the rivers Brentac and Bachiglione, in a fine plain; and is about ſeven miles in circumference. E. Long. 11. 55. N. Lat. 45. 24.

PADUANO, a ſmall province of Italy, in the territory of Venice, bounded on the eaſt by the Dogado, on the ſouth by the Poleſino di Rovigo, on the weſt by the Veroneſe, and on the north by the Vicentino. Its ſoil is well watered; and is one of the moſt fertile in Italy. The province is about 40 miles in length, and 35 in breadth. Padua is the capital town.

PADUAN, among the medaliſts, a modern medal ſtruck in imitation of the antique, or a new medal ſtruck with all the marks and characters of antiquity. This name is properly applicable to thoſe medals only that were ſtruck, in the ſeventh century, by an Italian painter, born at Padua; who ſucceeded ſo well in the impoſture, that the beſt judges are at a loſs to diſtinguiſh his medals from the genuine ones. Tho' it is frequently uſed in general for all medals of this kind.

PADUS, anciently called *Eridanus*, eſpecially by the Greeks; a river famous for the fable of Phaeton, (Ovid). It riſes in mount Veſulus, in the Alpes Cothiæ, from three ſprings, dividing the Ciſalpine Gaul into the Tranſpadana and Ciſpadana, (Strabo); and, ſwelled by other rivers falling into it on each ſide from the Alps and Appennines, it diſcharges itſelf with a courſe from weſt to eaſt, at ſeven mouths, into the Adriatic, (Mela). The lake thro' which it diſcharges itſelf into the ſea, is called by the natives the *Seven Seas*. Now the *Po*.

PADUS, in botany. See PRUNUS.

PÆAN, among the ancient pagans, was a ſong of rejoicing ſung in honour of Apollo, chiefly uſed on occaſions of victory and triumph. See APOLLO.

PÆAN, in the ancient poetry, a foot conſiſting of four ſyllables; of which there are four kinds, the pæan primus, ſecundus, &c.

The pæan primus conſiſts of one long ſyllable and three ſhort ones, or a trochæus and pyrrhichius, as *temporibus;* the pæan ſecundus conſiſts of a ſhort ſyllable, a long, and two ſhort, or an iambus and a pyrrhichius, as *potentia;* the pæan tertius conſiſts of two ſhort ſyllables, a long and a ſhort one, or a pyrrhichius and a trochæus, as *animatus;* the pæan quartus conſiſts of three ſhort ſyllables and a long one, or a pyrrhichius and iambus, as *celeritas*.

PÆDO-BAPTISM; infant-baptiſm, or that conferred on children.

PÆONIA, PIONY; a genus of the digynia order, belonging to the polyandria claſs of plants. There are two ſpecies, both of them very hardy, and will flouriſh in any common ſoil. They are large herbaceous flowery perennials, with tuberous roots, ſending up ſtrong annual ſtalks from one to three feet in height; terminated by very large flowers of a beautiful red colour, and much larger than any roſe. The common officinal, or male piony, alſo is remarkable for its capſules turning backward, opening and diſplaying their red inſide, together with the numerous ſeeds, in a ſingularly agreeable order, appearing very ornamental after the flower is paſt. The plants may be propagated either by parting the roots, or by ſeed. This plant was formerly celebrated in nervous diſtempers, but the preſent practice pays very little regard to it.

PÆSTUM, called *Poſidonia* by the Greeks, a town of Lucania, on the Sinus Pæſtinus: an ancient colony prior to the firſt Punic war, according to Livy; but later, according to Velleius. *Pæſtanæ roſæ* were in great eſteem, and produced twice a-year. (Virgil, Ovid).

PAGAN, a heathen, gentile, or idolater; one who adores falſe gods. See MYTHOLOGY.

PAGANALIA, certain feſtivals obſerved by the ancient Romans in the month of January. They were inſtituted by Servius Tullius, who appointed a certain number of villages *(pagi)*, in each of which an altar was to be raiſed for annual ſacrifices to their tutelar gods; at which all the inhabitants were to aſſiſt, and give preſents in money, according to their ſex and age, by which means the number of country-people was known. The ſervants upon this occaſion offered cakes to Ceres and Tellus, to obtain plentiful harveſts.

PAGANELLUS, in ichthyology. See GOBIUS.

PAGANISM, the religious worſhip and diſcipline of pagans; or, the adoration of idols and falſe gods. See IDOLATRY and MYTHOLOGY.

PAGEANT, a triumphal car, chariot, arch, or other like pompous decoration, variouſly adorned with colours, flags, &c. carried about in public ſhews, proceſſions, &c.

PAGI (Antony), a very famous Cordelier, and one of the ableſt critics of his time, was born at Rogne in Provence in 1624. He took the habit in the convent at Arles in 1641, and was at length four times provincial of his order; but his religious duties did not prevent his vigorous application to the ſtudy of chronology and eccleſiaſtical hiſtory, in which he excelled. His moſt conſiderable work is, "A Critique upon the Annals of Baronius;" where, following the learned cardinal year by year, he has rectified an infinite number of miſtakes, both in chronology and in the repreſentation of facts. He publiſhed the firſt volume in 1689, dedicated to the clergy of France, who allowed him a penſion: the whole was printed after his death, in 4 vols, folio, at Geneva, in 1705, by the care of his nephew Francis Pagi, of the ſame order. He wrote ſome other things before his death, which happened in 1699; and had the character of an able hiſtorian as well as of a learned and candid critic. His nephew, Francis, above mentioned, wrote "A Chronological Abridgment of the hiſtory of the Popes," in Latin, 3 vols, 4to. Francis had alſo a nephew, Anthony Pagi, who added three more volumes to the Hiſtory of the Popes; of which two more were intended, if not executed.

PAGNINUS (Sanctes), a Dominican, illuſtrious for his ſkill in the Oriental languages, was born at Lucca in 1466. He applied himſelf to examine the vulgar tranſlation of the Scriptures; and believing it to be either not of Jerom, or greatly corrupted, he undertook a new one from the preſent Hebrew text. It appears by a letter from Picus Mirandula to him, that he ſpent 25 years on this work, which is the firſt modern tranſlation from the Hebrew; and the Jews who read it, affirmed it to be more exact than the ancient tranſlations: this, however, was his fault; for his ſcrupulous ſervile adherence to the letter of the original text, has, according to father Simon, made his tranſlation obſcure, barbarous, and full of ſoleciſms. He afterward tranſlated the New Teſtament from the Greek, as he had done the Old from the Hebrew, laying the Vulgar all the while before him; and dedicated it to pope Clement VII. He was alſo the author of a Hebrew Grammar and Lexicon, which Buxtorf made great uſe of in compiling his; and died in 1536.

PAGOD, or PAGODA, a name whereby the Eaſt Indians call the temples where they worſhip their gods.

PAGOD, or *Pagoda*, is alſo the name of a gold and ſilver coin, current in ſeveral parts of the Eaſt Indies.

PAIN. See METAPHYSICS, n° 23, 71.

As the brain is the ſeat of ſenſation, ſo it is of pain. Boerhaave, and moſt other authors on this ſubject, aſſign a ſtretching of the nerves as the only immediate cauſe of pain: but as the nerves do not appear to conſiſt of fibres, this cauſe of pain does not ſeem to be well-founded; nor indeed will it be eaſy to treat this ſubject clearly, but in proportion as the means of ſenſation are underſtood.

Many kinds of pain are met with in authors: ſuch as, A gravitative pain; in which there is a ſenſe of weight on the part affected, which is always ſome fleſhy one, as the liver, &c. A pulſative pain; which, Galen ſays, always ſucceeds ſome remarkable inflammation in the containing parts, and is obſerved in abſceſſes while ſuppurating. A tenſive pain, which is alſo called a *diſtending* pain; it is excited by the diſtenſion of ſome nervous, muſcular, or membranous part, either from ſome humour, or from flatulence. An acute pain is, when great pain is attended with quick and lively ſenſations: A dull pain is, when a kind of numbneſs is as much complained of as the pain is.

The mediate and more remote cauſes of pain are generally obvious; and when ſo, the cure will conſiſt for the moſt part in removing them: for though in many inſtances the chief complaint is very diſtant from the ſeat of theſe cauſes, yet their removal is the proper method of relief. See MEDICINE, *paſſim*.

Perhaps all pains may be included, with irritation, in thoſe that have ſpaſm or inflammation for their ſource. When pain is owing to inflammation, the pulſe is quicker than in a natural ſtate; it is alſo generally full, hard, and tenſe; the pain is equal, throbbing, and unremitting. If a ſpaſm is the cauſe, the pulſe is rarely affected; at intervals the pain abates, and then returns with ſome degree of aggravation; gentle motion ſometimes abates, or even cures, in ſome inſtances: but in inflammatory caſes no ſuch effects are ever experienced. See Dr Lobb's *Treatiſe on Painful Diſtempers*.

The pain ſo frequently attendant on child-bed women, called *after-pains* (from their happening only after being delivered of a child), are often occaſioned by ſcooping to fetch away coagulated blood, which is a needleſs endeavour. When no improper treatment in delivering the ſecundines can be ſuſpected, the irritability of the uterus alone is to be conſidered as the cauſe. Care ſhould be taken not to confound theſe after-pains with, or miſtake the pains attending puerperal fevers for, the colic. After-pains come by fits, and ſoon go off; but return at different intervals, which are longer each day, and after two or three days are uſually at an end, though ſometimes they continue ſeven or eight: notwithſtanding theſe pains, the lochia flow properly, and generally more abundantly after the ceſſation of each fit; this does not happen in colicky complaints, nor is the belly ſo free from tumefaction when the purperal fever is attendant.

As theſe pains are of the ſpaſmodic kind, anodynes and gentle opiates, with frequent draughts of warm caudle, camomile tea, &c. are all that are required in order to their relief.

Among the various cauſes of pain, a ſingular one is related in the third vol. of the *Lond. Med. Obſ. and Inq.* p. 241, &c. Some perſons who had taken cold during their being ſalivated, were afflicted with pains which reſiſted all the uſual methods of relief: at length the author of the narrative referred to, ſuggeſted the cauſe; and by exciting a freſh ſalivation, the pains abated; the ſpitting was kept up a little while, and permitted to abate with ſome caution; and thus the cures were completed.

PAINTING.

PAINTING is the art of repreſenting to the eyes, by means of figures and colours, every object in nature that is diſcernible by the ſight; and of ſometimes expreſſing, by figures, the various emotions of the mind.

1. It is to be imagined that men muſt naturally and very early have conceived an idea of the firſt principles of the art of painting: the ſhadow of each plant and animal, and of each edifice, muſt have afforded them the means of conceiving the method of imitating the figures of all bodies whatever. But as in the firſt ages of the world the art of writing was unknown, as mankind were ignorant of aſtronomy, and as their year certainly did not conſiſt of the ſame number of days as does that of the moderns, how is it poſſible to determine the epoch, the preciſe date, of the riſe of each art or ſcience? The Egyptians pretend that painting was in uſe among them many ages before it was known among the Greeks: And the matter is highly probable; for the Egyptians being the moſt ancient people, the Greeks drew from them many other branches of learning; the hieroglyphics of the former were, moreover, a ſort of painting. Diodorus Siculus, *l.* ii. *c.* 4. relates, that Semiramis, having re-eſtabliſhed Babylon, built there a wall of two leagues and a half in circumference, the bricks of which were painted before they were burnt, and repreſented various kinds of animals. He adds, that ſhe had another wall, on which were the figures of all ſorts of animals painted in their natural colours: and that there were among them even pictures which repreſented hunting-matches and combats. This is, in fact, an anecdote of great antiquity.

2. The Greeks were acquainted with the art of writing: they were highly oſtentatious, and had among them

men of real genius. This was ſufficient to make them attribute the invention of all the arts and ſciences to themſelves. Their authors, however, do not agree about the inventor of painting. Pliny, in his Natural Hiſtory, *l.* xxxv. *c.* 12. aſſures us, that Dibutades, a potter of Sicyonia, invented the art of making figures in clay; but that he owed the invention to his daughter, who, on taking leave of her lover that was going to a diſtant country, contrived to trace on a wall, by the means of a lamp, the outline of his ſhadow: the father, by applying his clay to thoſe lines, formed a ſtatue, which he hardened in his ſtove; and which was preſerved in the temple of the Nymphs, till the time that Mummius ſignalized himſelf by the deſtruction of Corinth. Love, therefore, was the firſt maſter of painting; and that god ſeems, at this day, to have renewed in France that method of the Greeks, by thoſe portraits drawn from ſhadows, which they call *a la Silhouette*. It ſhould ſeem, however, that neither the Greek hiſtorians, nor Pliny, were acquainted with that book of Moſes intitled *Geneſis;* for they would have there ſeen, in the xxxi chapter, that Rachel, the wife of Jacob, ſtole from her father Laban his images, or little figures of houſehold gods; which was in the time of the higheſt antiquity: that Aaron afterwards made in the deſart a golden calf; that the ark of the covenant of the Hebrews was ornamented with figures of cherubims; that Moſes forbad the people the uſe of images: all of which ſuppoſes a knowledge of deſign.

Be this as it may, the Greeks ſeem to have carried the art to great perfection; if we may believe the ſtories related of their Apelles and Zeuxis.

3. The Romans were not without conſiderable maſters in this art, in the latter times of the republic, and under the firſt emperors; but the inundation of barbarians, who ruined Italy, proved fatal to painting, and almoſt reduced it to its firſt elements. It was in Italy, however, that the art returned to its ancient honour, and in the beginning of the 15th century; when Cimabue, betaking himſelf to the pencil, tranſlated the poor remains of the art, from a Greek painter or two, into his own country. He was ſeconded by ſome Florentines. The firſt who got any reputation was Ghirlandai, Michael Angelo's maſter; Pietro Perugino, Raphael Urbin's maſter; and Andrea Verocchio, Leonardo Da Vinci's maſter. But the ſcholars far ſurpaſſed the maſters; they not only effaced all that had been done before them, but carried painting to the higheſt perfection of which it is capable. It was not by their own noble works alone that they advanced painting; but by the number of pupils they bred up, and the ſchools they formed. Angelo, in particular, founded the ſchool of Florence; Raphael, the ſchool of Rome; and Leonardo, the ſchool of Milan; to which muſt be added the Lombard ſchool, eſtabliſhed about the ſame time, and which became very conſiderable under Giorgione and Titian.

Beſides the Italian maſters, there were others on this ſide the Alps, who had no communication with thoſe of Italy: ſuch were Albert Durer, in Germany; Holbens, in Switzerland; Lucas, in Holland; and others in France and Flanders. But Italy, and particularly Rome, was the place where the art was practiſed with the greateſt ſucceſs; and where, from time to time, the greateſt maſters were produced.

To Raphael's ſchool, ſucceeded that of the Caraccios; which has laſted, in its ſcholars, almoſt to the preſent time.

It is of the different parts of this art thus re-eſtabliſhed, extended, and improved, that we are here to treat.

PART I. Principles of the ART, and the Order of the Artiſt's STUDIES.

SECT. I. *Of the Firſt Exerciſes of a Painter.*

4. IT is not a matter of ſo little importance, as ſome are, perhaps, apt to imagine, upon what drawings a pupil is firſt put to exerciſe his talents. Let the firſt profiles, the firſt hands, the firſt feet, given him to copy, be of the beſt maſters, ſo as to bring his eye and his hand early acquainted with the moſt elegant forms, and the moſt beautiful proportions. A youth, employed in copying the work of a middling painter, in order to proceed afterwards to ſomething of Raphael's, having ſaid, in the hearing of a maſter, That he did it in order to bring his hand in; the maſter, as ſenſibly as wittily, replied, "Say rather, to put it out." A painter, who has early acquired a fine ſtyle, finds it an eaſy matter to give dignity to the meaneſt features, while even the works of a Praxiteles or a Glycon are ſure to ſuffer in the hands of another. A veſſel will ever retain the ſcent which it has firſt contracted.

It would be proper alſo to make the pupil copy ſome fine heads from the Greek and Roman medals: not ſo much for the reaſons juſt now laid down, as to make him acquainted, if we may uſe the expreſſion, with thoſe perſonages which in time he may have occaſion to introduce into his pieces; and, above all, to improve him early in the art of copying from relief. Hence he will learn the rationale of light and ſhade, and the nature of that *chiar-oſcuro*, by which it is, properly ſpeaking, that the various forms of things are diſtinguiſhed. To this it is owing, that a boy will profit more by drawing after things in relief, though but meanly executed, than by copying the moſt excellent drawings. But, whatever he does, care ſhould be taken to make him do it with delight, and finiſh it in the moſt accurate manner. Nothing in the world is ſo neceſſary as diligence; eſpecially at the firſt entrance upon any ſtudy. Nor muſt he ever expect to have the compaſſes in his eye, who has not firſt had them for a long time in his hand.

SECT. II. *Of Anatomy.*

5. To aſk if the ſtudy of anatomy is requiſite to a painter, is the ſame thing as to aſk if, in order to learn any ſcience, a man muſt firſt make himſelf acquainted with the principles of it. It would be throwing away time to cite, in confirmation of this truth, the authorities of the ancient maſters, and the moſt celebrated ſchools. A man, who is unacquainted with the form and conſtruction of the ſeveral bones which ſupport and govern the human frame, and does not know in what manner the muſcles moving theſe bones are fixed to

them, can make nothing of what appears of them thro' the integuments with which they are covered; and which appearance is, however, the nobleſt object of the pencil. It is impoſſible for a painter to copy faithfully what he ſees, unleſs he thoroughly underſtands it. Let him employ ever ſo much time and ſtudy in the attempt, it cannot but be attended with many and great miſtakes: juſt as it muſt happen to a man, who undertakes to copy ſomething in a language which he does not underſtand; or to tranſlate into his own, what has been written in another, upon a ſubject with which he is not acquainted.

It ſeldom happens, that nothing more is required of a painter than to copy exactly an object which he has before him. In ſtill and very languid attitudes, in which every member is to appear motionleſs and dead, a living model may, no doubt, yield for a long time a faithful image, and prove an uſeful pattern to him, But in regard to geſtures any way ſudden, motions any way violent, or thoſe momentary attitudes which it is more frequently the painter's buſineſs to expreſs, the caſe is quite different. In theſe a living model can hold but an inſtant or two; it ſoon grows languid, and ſettles into a fixed attitude, which is produced by an inſtantaneous concourſe of the animal-ſpirits. If, therefore, a painter poſſeſſes not ſo thoroughly all the principles of anatomy, as to be at all times able to have immediate recourſe to them; if he knows not the various manners in which the ſeveral parts of the human body play, according to their various poſitions; living models, far from proving an uſeful pattern to him, will rather tend to lead him aſtray, and make him loſe ſight of truth and nature, by exhibiting the very reverſe of what is required, or at leaſt exhibiting it in a very faint and imperfect manner. In living models, we often behold thoſe parts ſlow, which ſhould be very quick; thoſe cold and torpid, which ſhould have the greateſt ſhare of life and ſpirit in them.

Nor is it, as ſome may be apt to imagine, merely to repreſent athletic and vigorous bodies, in which the parts are moſt bold and determined, that anatomy is requiſite: it ſhould be underſtood, to repreſent perſons of the moſt delicate frame and condition, even women and children, whoſe members are ſmootheſt and roundeſt, though the parts made known by it are not to be ſtrongly expreſſed in ſuch objects; juſt as logic is equally requiſite under the poliſhed inſinuations of the orator and the rough arguments of the philoſopher.

But it is needleſs to ſpend much time in proving, that a painter ſhould be acquainted with anatomy; or in ſhowing, how far his acquaintance with it ſhould extend. For inſtance, it is unneceſſary for him to enter into the different ſyſtems of the nerves, blood-veſſels, bowels, and the like; parts which are removed from the ſight, and which therefore may be left to the ſurgeon and the phyſician, as being a guide in the operations of the former and in the preſcriptions of the latter. It is enough for the painter, to be acquainted with the ſkeleton; in other words, with the figure and conection of the bones, which are, in a manner, the pillars and props of the human body; the origin, progreſs, and ſhape, of the muſcles, which cover theſe bones; as alſo the different degrees in which nature has cloathed the muſcles with fat, for this ſubſtance lies thicker upon them in ſome places them in others. Above all, he ſhould know, in what manner the muſcles effect the various motions and geſtures of the body. A muſcle is compoſed of two tendinous and ſlender parts, one called the *head*, the other the *tail*, both terminating at the bones; and of an intermediate part, called the *belly*. The action of a muſcle conſiſts in an extraordinary ſwelling of this intermediate part, while the head remains at reſt, ſo as to bring the tail nearer the head, and conſequently the part, to which the tail of the muſcle is fixed, nearer to that part into which the head is inſerted.

There are many motions, to effect which ſeveral of the muſcles (for this reaſon called *co-operating muſcles)* muſt ſwell and operate together, while thoſe calculated to effect a contrary motion (and therefore called *antagoniſt muſcles)* appear ſoft and flaccid. Thus, for example, the biceps and the brachiæus internus labour when the arm is to be bent, and become more prominent than uſual; while the gemellus, the brachiæus externus, and the anconæus, whoſe office is to extend the arm, continue, as it were, flat and idle. The ſame happens reſpectively in all the other motions of the body. When the antagoniſt muſcles of any part operate at one and the ſame time, ſuch part becomes rigid and motionleſs. This action of the muſcle is called *tonic*.

Michael Angelo intended to have given the public a complete treatiſe upon this ſubject; and it is no ſmall misfortune, that he never accompliſhed ſo uſeful a deſign. This great man, having obſerved, as we are told in his life by Condivi, that Albert Durer was deficient on the ſubject, as treating only of the various meaſures and forms of bodies, without ſaying a word of their attitudes and geſtures, though things of much greater importance, reſolved to compoſe a theory, founded upon his long practice, for the ſervice of all future painters and ſtatuaries. And, certainly, no one could be better qualified to give anatomical precepts for that purpoſe, than he, who, in competition with Da Vinci, deſigned that famous cartoon of naked bodies, which was ſtudied by Raphael himſelf, and afterwards obtained the approbation of the Vatican, the greateſt ſchool of the art we are now treating of.

The want of Michael Angelo's precepts may, in ſome meaſure, be ſupplied by other books written on the ſame ſubject by Moro, Ceſio, and Tortebat; and lately by Boucherdon, one of the moſt famous ſtatuaries in France. But nothing can be of equal ſervice to a young painter, with the leſſons of ſome able diſſector; under whom, in a few months, he may make himſelf maſter of every branch of anatomy which he need to be acquainted with. A courſe of oſteology is of no great length: and of the infinite number of muſcles diſcovered by curious myologiſts, there are not above 80 or 90, with which nature ſenſibly operates all thoſe motions which he can ever have occaſion to imitate or expreſs. Theſe, indeed, he ſhould cloſely ſtudy, theſe he ſhould carefully ſtore up in his memory, ſo as never to be at the leaſt loſs for their proper figure, ſituation, office, and motion.

But there is another thing beſides the diſſection of dead bodies, by which a young painter may profit greatly; and that is, anatomical caſts. Of theſe we have numbers by ſeveral authors; nay ſome, which paſs under the name of *Buonarroti* himſelf. But there is one, in which, above all the reſt, the parts are moſt diſtinctly and lively expreſſed. This is the performance of Hercules Lelli, who has, perhaps, gone greater lengths in this kind of ſtudy than any other maſter. We have, beſides, by the ſame able hand, ſome caſts of particular parts of the human body, ſo curiouſly coloured for the uſe of young painters, as to repreſent theſe parts exactly as they appear on removing the integuments; and thus, by the difference in their colour as well as configuration, render the tendinous and the fleſhy parts, the belly and the extremities, of every muſcle ſupriſingly diſtinct; at the ſame time that, by the various direction of the fibres, the motion and play of theſe muſcles become very obvious; a work of the greateſt uſe, and never enough to be commended! Perhaps, indeed, it would be an improvement, to give the muſcles various tints; thoſe muſcles eſpecially, which the pupil might be apt to miſtake for others. For example, though the maſtoides, the deltoides, the ſartorius, the faſcia lata, the gaſterocnemii, are, of themſelves, ſufficiently diſtinguiſhable, it is not ſo with regard to the muſcles of the arm and of the back, the right muſcles of the belly, and ſome others, which, either on account of the many parts into which they branch, or of their being interwoven one with another, do not ſo clearly and fairly preſent themſelves to the eye. But let the cauſe of confuſion to young beginners be what it will, it may be effectually removed by giving, as already hinted, different colours to the different muſcles, and illumining anatomical figures; in the ſame manner that maps are, in order to enable us readliy to diſtinguiſh the ſeveral provinces of every kingdom, and the ſeveral dominions of every prince.

The better to underſtand the general effect, and remember the number, ſituation, and play of the muſcles, it will be proper to compare, now and then, the anatomical caſts, and even the dead body itſelf, with the living body covered with its fat and ſkin; and above all things, with the Greek ſtatues ſtill in being. It was the peculiar happineſs of the Greeks, to be able to characterize and expreſs the ſeveral parts of the human body much better than we can pretend to do; and this, on account of their particular application to the ſtudy of naked figures, eſpecially the fine living ones which they had continually before their eyes. It is well known, that the muſcles moſt uſed are likewiſe the moſt protuberant and conſpicuous; ſuch as, in thoſe who dance much, the muſcles of the legs; and in boatmen, the muſcles of the back and arms. But the bodies of the Grecian youth, by means of their conſtant exertion of them in all the gymnaſtic ſports, were ſo thoroughly exerciſed, as to ſupply the ſtatuary with much more perfect models than ours can pretend to be. It is not to be doubted, but that, for the ſame reaſon, the Greek painters attained the higheſt degree of perfection in the figures of thoſe pieces of theirs ſo much cried up by ancient authors; and it is a great pity, that we have not even thoſe copies of nature to direct our ſtudies. For the faults obſervable in the ancient paintings, which have been dug up in great numbers, eſpecially within theſe few years, do not ſo much tend to prove that the Greeks were any way deficient in this art, as the pieces themſelves, taken all together, that they had carried it to the higheſt degree of perfection. For, if in pictures drawn upon walls, which it was therefore impoſſible to reſcue from fire, and in little country towns, and at a time when the art was at its loweſt ebb, there appears, in the opinion of the beſt judges, ſuch excellence of deſign, colouring, and compoſition, that one would apt to atribute moſt of them to the ſchool of Raphael; what muſt we think of the pictures, drawn at an earlier period, by their ableſt maſters and for their moſt flouriſhing cities and moſt powerful monarchs; of pictures admired in a country like Greece, where every art was brought to ſuch a degree of perfection, that no paſſion could reſiſt their muſic, no ſentiment reſiſt their mimic arts; of pictures cried up a Pliny *, the ſoundneſs of whoſe judgment in matters of this kind diſplays itſelf in ſo many paſſages of his works; collected at ſuch expence by Julius Cæſar †, of whoſe fine taſte, the works compoſed by him, and ſtill extant, are a moſt inconteſtable proof? But what evinces ſtill better the excellence of the ancients in painting, is that to which they arrived in ſtatuary, her ſiſter art. Both daughters of deſign, they both enjoyed in common the ſame models, which, more perfect in the happy climate of Greece than in any other part of the globe, muſt have been of as great ſervice to the Apelleſes and the Zeuxiſes, in the drawing of their figures, as they were to the Apolloniuſes, the Glycons, and the Agaſies, in carving thoſe ſtatues which the world has ſtill the happineſs of poſſeſſing. Theſe maſters, being beſides aſſiſted by a proper inſight into anatomy, and thoroughly acquainted with the various play of the muſcles according to the various attitudes of the body, and with the different degrees of ſtrength with which each particular muſcle was to be expreſſed in each particular attitude, were thereby enabled to give truth, motion, and life, to all their works.

There are a great many exerciſes, which a young painter ſhould go through while engaged in the ſtudy of anatomy, in order to make himſelf more thoroughly maſter of that ſcience. For example: The thighs of any figure, a Laocoon for inſtance, being given, he ſhould add to them legs ſuitable to that ſtate in which the muſcles of the thighs are repreſented, that is, the muſcles which ſerve to bend and extend the legs, and to effectuate in them ſuch a preciſe poſition and no other. To the ſimple contour of an anatome, or a ſtatue, he ſhould add the parts included by it, and give it a ſyſtem of muſcles conformable to the quality of that particular contour; for every contour denotes ſome one certain attitude, motion, exertion, and no other. Exerciſes of this kind would ſoon eſtabliſh him in the moſt fundamental principles of painting, eſpecially if he had an opportunity of comparing his drawings with the ſtatue or caſt from which the parts given him to work upon were taken, and thereby diſcovering and correcting his miſtakes. This method is very like that uſed by thoſe who teach the Latin tongue; when, having given their ſcholars a paſſage of Livy or Cæſar already tranſlated into their mother-tongue, to tranſlate back into Latin, they make them compare their work with the original next.

SECT. III. *Of Perſpective.*

6. The ſtudy of perſpective ſhould go hand in hand

---

* *Nat. Hiſt.* lib. xxxvi. c. 25.

† *Suetonius*, in vit. Cæſ. cap. 27.

with that of anatomy, as not leſs fundamental and neceſſary. In fact, the contour of an object drawn upon paper or canvas, repreſents nothing more than ſuch an interſection of the viſual rays ſent from the extremities of it to the eye, as would ariſe on a glaſs put in the place of the paper or canvas. Now, the ſituation of an object at the other ſide of a glaſs being given, the delineation of it on the glaſs itſelf depends entirely on the ſituation of the eye on this ſide of the glaſs; that is to ſay, on the rules of perſpective: a ſcience which, contrary to the opinion of moſt people, extends much farther than the painting of ſcenes, floors, and what generally goes under the name of *quadratura*. Perſpective, according to that great maſter da Vinci, is to be conſidered as the reins and rudder of painting. It teaches in what proportion the parts fly from, and leſſen upon, the eye; how figures are to be marſhalled upon a plain ſurface, and fore-ſhortened. It contains, in ſhort, the whole rationale of deſign.

Such are the terms which the maſters beſt grounded in their profeſſion have employed to define and commend perſpective: ſo far were they from calling it a *fallacious art*, and an *inſidious guide*; as ſome amongſt the moderns have not bluſhed to do, inſiſting that it is to be followed no longer than it keeps the high road, or leads by eaſy and pleaſant paths. But theſe writers plainly ſhow, that they are equally ignorant of the nature of perſpective, which, founded as it is on geometrical principles, can never lead its votaries aſtray; and of the nature of their art, which, without the aſſiſtance of perſpective, cannot, in rigour, expect to make any progreſs, nay, not ſo much as delineate a ſimple contour.

Thoſe, too, who would perſuade us, that the ancient maſters of Greece knew nothing of perſpective, ſhow, that they themſelves know little or nothing of painting. They allege, as a proof of this their idle aſſertion, that the rules of perſpective are violated in the moſt of the ancient pictures that have reached us; as though the miſtakes and blunders of middling artiſts were a ſufficient ground for calling in queſtion the merit of others, who were allowed to excel in their profeſſion. Now, not to inſiſt on the abſurdity of ſuch a ſuppoſition, which we have already expoſed, Pamphilus, the maſter of Apelles, and the founder of the nobleſt ſchool of all Greece, has affirmed in the moſt expreſs terms, that, without geometry, painting muſt fall to the ground †. It is well known, beſides, that the ancients practiſed the art of painting in perſpective upon walls, in the ſame way that it is now done by the moderns *; and that one of the walls of the theatre of Claudius Pulcher, repreſenting a roof covered with tiles, was finiſhed in ſo maſterly a manner, that the rooks, a bird of no ſmall ſagacity, taking it for a real roof, often attempted to alight upon it ‡. We are likewiſe told, that a dog was deceived to ſuch a degree, by certain ſteps in a perſpective of Dento's, that, expecting to find a free paſſage, he made up to them in full ſpeed, and daſhed out his brains; thus immortalizing by his death the pencil of the artiſt, which had been the occaſion of it. But, what is ſtill more, Vitruvius || tells us in expreſs terms, by whom, and at what time, this art was invented. It was firſt practiſed by Agatharcus, a contemporary of Æſchylus, in the theatre of Athens; and afterwards reduced to certain principles, and treated as a ſcience, by Anaxagoras and Democritus; thus faring like all other arts, which exiſted in practice before they appeared in theory. The thing, perhaps, may be thus accounted for. Some painter, who happened to be a very accurate obſerver of nature, firſt exactly repreſented thoſe effects which he ſaw conſtantly attend the images offered to our eyes by exterior objects; and theſe effects came afterwards to be demonſtrated by geometricians as ſo many neceſſary conſequences, and reduced to certain theorems: juſt as from thoſe chef d'œuvres of the human mind, the Iliad of Homer, and Oedipus of Sophocles, both built upon the moſt accurate obſervations of nature, Ariſtotle found means to extract the rules and precepts contained in his art of poetry. It is therefore clear, that, ſo early as the age of Pericles, perſpective was reduced into a complete ſcience; which no longer continued confined to the theatre, but made its way into the ſchools of painting, as an art not leſs neceſſary to painters in general, than it had been found to ſcene-painters in particular. Pamphilus, who founded in Scion the moſt flouriſhing ſchool of deſign, taught it publicly; and from the time of Apelles, Protogenes, and the other bright luminaries of painting amongſt the ancients, it was practiſed by the Greek painters, in the ſame manner that it was, ſo many ages after, by Bellini, Pietro Perugino, and others, down to the days of Titian, Raphael, and Corregi, who put the laſt hand to painting, and gave it all that perfection it was capable of receiving.

Now, a painter having formed a ſcene in his mind, and ſuppoſed, as it is cuſtomary, that the capital figures of this ſcene lie cloſe, or almoſt cloſe, to the back of his canvas, he is, in the next place, to fix upon ſome point on this ſide of the canvas, from which he would chooſe his piece ſhould be ſeen. But in chooſing this point, which is called the *point of ſight*, regard ſhould be had to its ſituation to the right or left of the middle of the canvas: but, above all things, to its diſtance and its height with reſpect to the lower edge of the canvas; which edge is called the *baſe line*, and is parallel with the horizontal line that paſſes through the eye. For by aſſuming the point of ſight, and conſequently the horizontal line, too low, the planes, upon which the figures ſtand, will appear a great deal too ſhallow; as, by aſſuming it too high, they will appear too ſteep, ſo as to render the piece far leſs light and airy than it ought to be. In like manner, if the point of ſight is taken at too great a diſtance from the canvas, the figures will not admit of degradation enough to be ſeen with ſufficient diſtinctneſs; and if taken too near it, the degradation will be too quick and precipitate to have an agreeable effect. Thus, then, it appears, that no ſmall attention is requiſite in the choice of this point.

When a picture is to be placed on high, the point of ſight ſhould be aſſumed low, and *vice verſa*; in order that the horizontal line of the picture may be, as near as poſſible, in the ſame horizontal plane with that of the ſpectator; for this diſpoſition has an amazing effect. When a picture is to be placed very high, as, amongſt many others, that of the purification by Paolo Veroneſe, engraved by le Fevre, it will be proper to

† *Plinii Nat. Hiſt.* lib. xxxv. c. 10.

* *Vitruvius*, lib. vii. c. 5.

‡. *Plin. Nat. Hiſt.* lib. xxxv. c. 4.

|| *In Pref. Lib.* vii.

to aſſume the point of ſight ſo low, that it may lie quite under the picture, no part of whoſe ground is, in that caſe, to be viſible; for, were the point of ſight to be taken above the picture, the horizontal ground of it would appear ſloping to the eye, and both figures and buildings as ready to tumble head foremoſt. It is true, indeed, that there is ſeldom any neceſſity for ſuch extraordinary exactneſs; and that, unleſs in ſome particular caſes, the point of ſight had better be rather high than low: the reaſon of which is, that, as we are more accuſtomed to behold people on the ſame plane with ourſelves, than either higher or lower, the figures of a piece muſt ſtrike us moſt when ſtanding on a plane nearly level with that upon which we ourſelves ſtand. To this it may be added, that by placing the eye low, and greatly ſhortening the plane, the heels of the back figures will ſeem to bear againſt the heads of the foremoſt, ſo as to render the diſtance between them far leſs perceptible than otherwiſe it would be.

The point of ſight being fixed upon, according to the ſituation in which the picture is to be placed, the point of diſtance is next to be determined. In doing this, a painter ſhould carefully attend to three things: firſt, that the ſpectator may be able to take in, at one glance, the whole and every part of the compoſition; ſecondly, that he may ſee it diſtinctly; and thirdly, that the degradation of the figures and other objects of the picture be ſufficiently ſenſible. It would take up too much time to lay down certain and preciſe rules for doing all this, conſidering the great variety in the ſizes and ſhapes of pictures; for which reaſon we muſt leave a great deal to the diſcretion of the painter.

But there is a point ſtill remaining, which will not admit of the leaſt latitude. This is, the delineation of the picture, when once the point of ſight has been fixed upon. The figures of a picture are to be conſidered as ſo many columns erected on different ſpots of the ſame plane; and the painter muſt not think of deſigning any thing, till he has laid down, in perſpective, all thoſe columns which are to enter his compoſition, with the moſt ſcrupulous exactneſs. By proceeding in this manner, he may not only be ſure of not committing any miſtake in the diminution of his figures according to their different diſtances, but may flatter himſelf with the thoughts of treading in the ſteps of the greateſt maſters, eſpecially Raphael, in whoſe ſketches (ſuch was his reſpect to the laws of perſpective) we frequently meet with a ſcale of degradation. It is to the punctual obſervance of theſe laws, that we are to attribute the grand effect of ſome paintings by Carpazio and Mantegna, ſo careleſs in other reſpects; whereas a ſingle fault againſt them is often ſufficient entirely to ſpoil the works of a Guido, in ſpite of the ſublimity and beauty of his ſuperior ſtyle.

Now, as the demonſtration of the rules of perſpective depends on the doctrine of proportions, on the properties of ſimilar triangles, and on the interſection of planes, it will be proper to put an abridgement of Euclid into the hands of the young painter, that he may underſtand theſe rules fundamentally, and not ſtand confined to a blind practice of them: but, then, there is nothing in this author, relative to the art of painting, which may not be eaſily acquired in a few months. For, as it would be of no uſe to a painter to lanch out into the anatomical depths of a Monro or an Albinus, it would be equally ſuperfluous to perplex himſelf with the intricacies of the higher geometry with a Taylor, who has handled perſpective with that rich profoundneſs, which we cannot help thinking does a great deal more honour to a mathematician, than it can poſſibly bring advantage to a ſimple artiſt.

But though a much longer time were requiſite to become a perfect maſter of perſpective, a painter, ſurely, ought not to grudge it; as no time can be too long to acquire that knowledge, without which he cannot poſſibly expect to ſucceed. Nay, we may boldly affirm, that the ſhorteſt road in every art is that which leads through theory to practice. It is from theory that ariſes that great facility, by means of which a man advances the quicker, in proportion as he is ſurer of not taking a wrong ſtep: whilſt thoſe, who are not grounded in the ſcience, labour on in perpetual doubt; obliged, as a certain author expreſſes it, to feel out their way with a pencil, juſt as the blind, with their ſticks, feel for the ſtreets and turnings, with which they are not acquainted.

As practice, therefore, ought in every thing to be built upon principle, the ſtudy of Optics, as far as it is requiſite to determine the degree in which objects are to be illuminated or ſhaded, ſhould proceed hand in hand with that of perſpective: And this, in order that the ſhades, caſt by figures upon the planes on which they ſtand, may fall properly, and be neither too ſtrong nor too light; in a word, that thoſe moſt beautiful effects of the chiar-oſcuro may run no riſk of ever receiving the lie from truth, which ſooner or later diſcovers itſelf to every eye.

SECT. IV. *Of Symmetry.*

7. THE ſtudy of ſymmetry, it is obvious, ſhould immediately follow that of anatomy: for it would avail us little to be acquainted with the different parts of the human body, and their ſeveral offices, were we at the ſame time ignorant of the order and proportion of theſe parts in regard to the whole in general, and each other in particular. The Greek ſtatuaries diſtinguiſhed themſelves above all others, as much by the juſt ſymmetry of their members, as by their ſkill in anatomy; but Polycletes ſurpaſſed them all by a ſtatue, called the *Rule*, from which, as from a moſt accurate pattern, other artiſts might take meaſures for every part of the human body. Theſe meaſures, to ſay nothing of the books which treat profeſſedly of them, may now be derived from the Apollo of Belvedere, the Laocoon, the Venus of Medicis, the Faunus, and particularly the Antinous, which laſt was the rule of the learned Pouſſin.

Plinii Nat. Hiſt. lib. xxxiv. c. 8.

Nature, which in the formation of every ſpecies ſeems to have aimed at the laſt degree of perfection, does not appear to have been equally ſolicitous in the production of individuals. She conſiders, one would think, thoſe things as nothing, which have a beginning and an end, and whoſe exiſtence is of ſo ſhort a duration, that they may be ſaid, in a manner, to come into the world merely to leave it. She ſeems, in ſome ſort, to abandon individuals to ſecond cauſes; and if from them there now and then breaks forth a primitive ray of perfection, it is too ſoon eclipſed by the clouds of imperfection that conſtantly attend it. Now, Art ſoars up to the archtypes of Nature; collects the flowers of every beauty, which it here and there meets with; combines all the perfect models that come in its way; and propoſes them to men for their imitation. Thus, the painter, who had before him a company of naked Calabrian girls, traced, as la Caſa † ingeniouſly expreſſes it, the reſpective beauties which they had as it were borrowed from one ſingle body; that, by making each of them reſtore to this imaginary form what ſhe had borrowed from it, he might be furniſhed with a complete pattern; rightly imagining, that from ſuch an union, and of ſuch beauties, muſt reſult the beauty of an Helen. This was likewiſe the practice of the ancient ſtatuaries, when about to form in braſs or marble the ſtatues of their gods or heroes. And, thanks to the hardneſs of theſe materials, ſome of their works, containing united all that poſſible perfection which could be found ſcattered here and there in individuals, ſubſiſt to this day as patterns not only of exact ſymmetry, but of ſupereminent grandeur in the parts, gracefulneſs and contraſt in the attitudes; in ſhort, as paragons in every kind, and the very mirrors of beauty. In them we behold precept joined with example: in them we ſee where the great maſters of antiquity deviated with a happy boldneſs from the common rules; or rather made them bend to the different characters they were to repreſent. In their Niobe, for inſtance, which was to breathe majeſty like Juno, they have altered ſome parts that appear more delicate and ſlender in their Venus, the pattern of female beauty. The legs and thighs of the Apollo of Belvidere, by being made ſomewhat longer than the common proportion of theſe limbs to the reſt of the body ſeems to admit, contribute not a little to give him that eaſe and freedom which correſpond ſo well with the activity attributed to that deity; as, on the other hand, the extraordinary thickneſs of the neck adds ſtrength to the Farneſian Hercules, and gives him ſomething of a bull-like look and robuſtneſs.

It is the general opinion of painters, that the ancients were not as happy in repreſenting the bodies of children, as they are allowed to have been in repreſenting thoſe of women and men; eſpecially thoſe of their gods; in which they excelled to ſuch a degree, that with theſe gods were often worſhipped the artiſts who had carved them. Yet the Venus of Gnidus by Praxiteltes was not more famous than her Cupid, on whoſe account alone people flocked to Theſpiæ †. To children, ſay they, the ancients knew not how to impart that ſoftneſs and effeminacy, which Fiammingo has ſince contrived to give them, by repreſenting their cheeks, hands, and feet, ſwelled, their heads large, and with ſcarce any belly. But ſuch critics ſeem to forget, that theſe firſt ſketches of nature very ſeldom come in the painter's way, and that this puny and delicate ſtate has not in its form even the leaſt glimmering of perfection. The ancients never undertook to repreſent children leſs than four or five years old; at which age the ſuperfluous humours of the body being in ſome meaſure digeſted, their members begin to aſſume ſuch a contour and proportion, as may ſerve to point out what they are afterwards likely to be. This obſervation is confirmed by the children which we meet with in ancient baſſo-relievos and paintings: for they are all doing one thing or another; like thoſe moſt beautiful little Cupids in a picture at Venice, who are playing with the arms of Mars, and lifting up the ponderous ſword of that deity; or that little urchin in the Danäe of Caracci, who empties a quiver of its arrows, in order to fill it with the golden ſhower. Now, what can be a greater blunder in point of coſtume, than to attribute actions, which require ſome degree of ſtrength and judgment, to infancy, to that raw and tender age ſo totally unable to govern and ſupport itſelf?

Let a young painter conſider the Greek ſtatues ever ſo often, of whatever character or age they may be repreſented, it is impoſſible he ſhould ever conſider them without diſcovering new beauties in them. It is therefore impoſſible he ſhould copy them too often, according to that judicious motto placed by Moratti on his print called *The ſchool.* This truth was acknowledged by Rubens himſelf: for though, like one bred, as he was, in the foggy climate of the Low Countries, he generally painted from the life; in ſome of his works he copied the ancients; nay, he wrote a treatiſe on the excellency of the ancient ſtatues, and on the duty of a painter to ſtudy and imitate them. As to the ſatirical print, or rather paſquinade, of the great Titian, in which he has repreſented a parcel of young monkeys aping the groupe of Laocoon and his ſons; he intended nothing more by it than to laſh the dulneſs and poverty of thoſe artiſts, who cannot ſo much as draw a figure without having a ſtatue before them as a model.

In fact, reaſon requires, that an artiſt ſhould be ſo much maſter of his art, as ſeldom to ſtand in need of a pattern. To what other purpoſe is he to ſweat and toil from his infancy, and ſpend ſo many days and nights in ſtudying and copying the beſt models; eſpecially the fineſt faces of antiquity, which we are ſtill poſſeſſed of; ſuch as the two Niobes, mother and daughter; the Ariadne, the Alexander, the young Nero, the Silenus, the Nile; and likewiſe the fineſt figures; for inſtance, the Apollo, the Gladiator, the Venus, and others; all which (as was ſaid of Pietro Feſta), he ſhould have, as it were, perfectly by heart? With a ſtock of excellencies like theſe, treaſured up in his memory, he may one day hope to produce ſomething of his own without a model; form a right judgement of thoſe natural beauties which fall in his way; and, when occaſion offers, avail himſelf properly of them.

It is very ill done to ſend boys to an academy to draw after naked figures, before they have imbibed a proper reliſh for beautiful proportions, and have been well-grounded in the true principles of ſymmetry. They ſhould firſt learn, by ſtudying the precious remains of antiquity, to improve upon life; and diſcern where a natural figure is faulty through ſtiffneſs in the members, or clumſineſs in the trunk, or in any other reſpect; ſo as to be able to correct the faulty part, and reduce it to its proper bounds. Painting, in this branch, is, like medicine, the art of taking away and adding.

It muſt not, however, be diſſembled, that the methods hitherto laid down are attended with ſome danger;

---

† In *Galatea.* See alſo the *Life of Zeuxis,* by Carlo Dati, note 11.

† *Cic. in Verrem, de ſignis. Strabo,* lib. ix. *Plin. Nat. Hiſt.* lib. xxxvi. c. 5.

ger: for by too ſlaviſh an attention to ſtatues, the young painter may contract a hard and dry manner; and by ſtudying anatomies too ſervilely, a habit of repreſenting living bodies as ſtripped of their ſkin: for, after all, there is nothing but what is natural, that, beſides a certain peculiar grace and livelineſs, poſſeſſes that ſimplicity, eaſe, and ſoftneſs, which is not to be expected in the works of art, or even in thoſe of nature when deprived of life. Pouſſin himſelf has now and then given into one of theſe extremes, and Michael Angelo very often into the other: but from this we can only infer, that even the greateſt men are not infallible. It is, in ſhort, to be conſidered as one inſtance, among a thouſand, of the ill uſe thoſe are wont to make of the beſt things, who do not know how to temper and qualify them properly with their contraries.

But no ſuch danger can ariſe to a young painter from confining himſelf for a long time to mere deſign, ſo as not to attempt colouring till he has made himſelf maſter of that branch. If, according to a great maſter †, colours in painting are in regard to the eye what numbers in poetry are in regard to the ear, ſo many charms to allure and captivate that ſenſe; may we not affirm, that deſign is in the ſame art what propriety of language is in writing, and a juſt utterance of ſounds in muſic? Whatever ſome people may think, a picture deſigned according to the rules of perſpective and the principles of anatomy, will ever be held in higher eſteem by good judges, than a picture ill deſigned, let it be ever ſo well coloured. Annibal Caracci ſet ſo great a value upon the art of contour, that, according to ſome expreſſions of his which have reached us, he conſidered almoſt every thing elſe as nothing in compariſon with it. And this his judgment may be juſtified, by conſidering, that nature, though ſhe forms men of various colours and complections, never operates in their motions contrary to the mechanical principles of anatomy, nor, in exhibiting theſe motions to the eye, againſt the geometrical laws of perſpective: a plain proof, that, in point of deſign, no miſtake is to be deemed trifling. Hence we are enabled to feel all the weight of thoſe words in which Michael Angelo, after he conſidered a picture drawn by a prince of the Venetian ſchool, addreſſed Vaſari: "What a pity it is," ſaid he, "that this man did not ſet out by ſtudying deſign!" As the energy of nature ſhines moſt in the ſmalleſt ſubjects, ſo the energy of art ſhines moſt in imitating them.

SECT. V. *Of Colouring.*

8. IT muſt likewiſe be of great ſervice to a painter deſirous to excel in colouring, to be well acquainted with that part of Optics which has the nature of light and colours for its object. Light, however ſimple and uncompounded it may appear, is nevertheleſs made up, as it were, of ſeveral diſtinct ſubſtances; and the number, and even doſe, of theſe ingredients, has been happily diſcovered by the moderns. Every undivided ray, let it be ever ſo fine, is a little bundle of red, orange, yellow, green, azure, indigo, and violet rays, which, while combined, are not to be diſtinguiſhed one from another, and from that kind of light called *white*; ſo that white is not a colour *per ſe*, as the learned da Vinci ‡ (ſo far, it ſeems, the precurſor of Newton) expreſsly affirms, but an aſſemblage of colours. Now, theſe colours, which compoſe light, although immutable in themſelves, and endued with various qualities, are continually, however, ſeparating from each other in their reflection from and paſſage through other ſubſtances, and thus become manifeſt to the eye. Graſs, for example, reflects only green rays, or rather reflects green rays in greater number than it does thoſe of any other colour; and one kind of wine tranſmits red rays, and another yellowiſh rays: and from this kind of ſeparation ariſes that variety of colours with which nature has diverſified her various productions. Man, too, has contrived to ſeparate the rays of light by making a portion of the ſun's beams paſs through a glaſs priſm; for after paſſing through it, they appear divided into ſeven pure and primitive colours, placed in ſucceſſion one by the other, like ſo many colours on a painter's pallet.

Now, though Titian, Correggio, and Vandyke, have been excellent colouriſts, without knowing any thing of theſe phyſical ſubtleties, that is no reaſon why others ſhould neglect them. For it cannot but be of great ſervice to a painter to be well acquainted with the nature of what he is to imitate, and of thoſe colours with which he is to give life and perfection to his deſigns; not to ſpeak of the pleaſure there is in being able to account truly and ſolidly for the various effects and appearances of light. From a due tempering, for example, and degrading, of the tints in a picture; from making colours partake of each other, according to the reflection of light from one object to another; there ariſes, in ſome meaſure, that ſublime harmony which may be conſidered as the true muſic of the eye. And this harmony has its foundation in the genuine principles of optics. Now this could not happen in the ſyſtem of thoſe philoſophers, who held, that colours did not originally exiſt in light, but were, on the contrary, nothing elſe than ſo many modifications which it underwent in reflecting from or paſſing through other ſubſtances; thus ſubject to alterations without end, and every moment liable to periſh. Were that the caſe, bodies could no more receive any hues one from another, nor this body partake of the colour of that, than ſcarlet, for example, becauſe it has the power of changing into red all the rays of the ſun or ſky which immediately fall upon it, has the power of changing into red all the other rays reflected to it from a blue or any other colour in its neighbourhood. Whereas, allowing that colours are in their own nature immutable one into another, and that every body reflects more or leſs every ſort of coloured rays, though thoſe rays in the greateſt number which are of the colour it exhibits, there muſt neceſſarily ariſe, in colours placed near one another, certain particular hues or temperaments of colour: nay, this influence of one colour upon another may be ſo far traced, that three or four bodies of different colours, and likewiſe the intenſeneſs of the light falling upon each, being aſſigned, we may eaſily determine in what ſituations, and how much, they would tinge each other. We may thus, too, by the ſame principle of optics, account for ſeveral other things practiſed by painters; inſomuch that a perſon, who has carefully obſerved natural effects with an eye directed by ſolid learning, ſhall be able to form general rules, where another can only diſtinguiſh particular caſes.

But after all, the pictures of the beſt colouriſts are, it is univerſally allowed, the books in which a young painter muſt chiefly look for the rules of colouring; that is, of that branch of painting which contributes ſo much to expreſs the beauty of objects, and is ſo requiſite to repreſent them as what they really are. Giorgone and Titian ſeem to have diſcovered circumſtances in nature which others have entirely overlooked; and the laſt in particular has been happy enough to expreſs them with a pencil as delicate as his eye was quick and piercing. In his works we behold that ſweetneſs of colouring which is produced by union; that beauty which is conſiſtent with truth; and all the inſenſible tranſmutations, all the ſoft tranſitions, in a word, all the pleaſing modulations, of tints and colours. When a young painter has, by cloſe application, acquired from Titian, whom he can never ſufficiently dwell upon, that art which, of all painters, he has beſt contrived to hide, he would do well to turn to Baſſano and Paolo, on account of the beauty, boldneſs, and elegance of their touches. That richneſs, ſoftneſs, and freſhneſs of colouring, for which the Lombard ſchool is ſo juſtly cried up, may likewiſe be of great ſervice to him. Nor will he reap leſs benefit by ſtudying the principles and practice of the Flemiſh ſchool; which, chiefly by means of her varniſhes, has contrived to give a moſt enchanting luſtre and tranſparency to her colours.

---

† Pouſſin; his *Life*, Bellori.

‡ Trattato lla Pit- , c. 14.

But whatever pictures a young painter may chooſe to ſtudy the art of colouring upon, he muſt take great care that they are well preſerved. There are very few pieces which have not ſuffered more or leſs by the length, not to ſay the injuries, of time; and perhaps that precious patina, which years alone can impart to paintings, is in ſome meaſure akin to that other kind which ages alone impart to medals; inaſmuch as, by giving teſtimony to their antiquity, it renders them proportionably beautiful in the ſuperſtitious eyes of the learned. It muſt indeed be allowed, that if, on the one hand, this patina beſtows, as it really does, an extraordinary degree of harmony upon the colours of a picture, and deſtroys, or at leaſt greatly leſſens, their original rawneſs, it, on the other hand, equally impairs the freſhneſs and life of them. A piece ſeen many years after it has been painted, appears much as it would do, immediately after painting, behind a dull glaſs. It is no idle opinion, that Paolo Veroneſe, attentive above all things to the beauty of his colours, and what is called *ſtrepito*, left entirely to time the care of harmonizing them perfectly and (as we may ſay) mellowing them. But moſt of the old maſters took that taſk upon themſelves; and never expoſed their works to the eyes of the public, until they had ripened and finiſhed them with their own hands. And who can ſay whether the *Chriſt* of Moneta, or the *Nativity* of Baſſano, have been more improved or injured (if we may ſo ſpeak) by the touchings and retouchings of time, in the courſe of more than two centuries? It is indeed impoſſible to be determined. But the ſtudious pupil may make himſelf ample amends for any injuries which his originals may have received from the hands of time, by turning to truth, and to Nature which never grows old, but conſtantly retains its primitive flower of youth, and was itſelf the model of the models before him. As ſoon, therefore, as a young painter has laid a proper foundation for good colouring, by ſtudying the beſt maſters, he ſhould turn all his thoughts to truth and nature. And it would perhaps be well worth while to have, in the academies of painting, models for colouring as well as deſigning; that as from the one the pupils learn to give their due proportion to the ſeveral members and muſcles, they may learn from the other to make their carnations rich and warm, and faithfully copy the different local hues which appear quite diſtinct in the different parts of a fine body. To illuſtrate ſtill farther the uſe of ſuch a model, let us ſuppoſe it placed in different lights; now in that of the ſun, now in that of the ſky, and now again in that of a lamp or candle; one time placed in the ſhade, and another in a reflected light. Hence the pupil may learn all the different effects of the complection in different circumſtances, whether the livid, the lucid, or tranſparent; and, above all, that variety of tints and half-tints, occaſioned in the colour of the ſkin by the epidermis having the bones immediately under it in ſome places, and in others a greater or leſs number of blood-veſſels or quantity of fat. An artiſt who had long ſtudied ſuch a model, would run no riſk of degrading the beauties of nature by any particularity of ſtyle, or of giving into that prepoſterous fulneſs and floridneſs of colour which is at preſent ſo much the taſte. He would not feed his figures with roſes, as an ancient painter of Greece ſhrewdly expreſſed it, but with good beef; a difference, which the learned eye of a modern writer could perceive between the colouring of Barocci and that of Titian. To practiſe in that manner, is, according to a great maſter, no better than inuring one's ſelf to the commiſſion of blunders. What ſtatues are in deſign, nature is in colouring; the fountain-head of that perfection to which every artiſt, ambitious to excel, ſhould conſtantly aſpire: and accordingly the Flemiſh painters, in conſequence of their aiming ſolely to copy nature, are in colouring as excellent as they are wont to be aukward in deſigning.

Webb, dial. 5.

SECT. VI. *Of the Camera Obſcura.*

9. We may well imagine, that could a young painter but view a picture by the hand of nature herſelf, and ſtudy it at his leiſure, he would profit more by it than by the moſt excellent performances by the hand of man. Now, nature is continually forming ſuch pictures in our eye. The rays of light coming from exterior objects, after entering the pupil paſs through the cryſtalline humour; and, being there refracted in conſequence of the lenticular form of that part, proceed to the retina, which lies at the bottom of the eye, and ſtamp up it, by their union, the image of the object towards which the pupil is directed. The conſequence of which is, that the ſoul, by means as yet unknown to us, receives immediate intelligence of theſe rays, and comes to ſee the objects that ſent them. But this grand operation of nature, the diſcovery of which was reſerved for our times, might have remained an idle amuſement of phyſical curioſity, without being of the leaſt ſervice to the painter, had not means been happily found of imitating it. The machine contrived for this purpoſe, conſiſts of a lens and mirrror ſo ſituated, that the ſecond throws the picture of any thing properly expoſed to the firſt, and that too of a competent largeneſs, on a clean ſheet of paper, where it may be ſeen and contemplated at leiſure.

As this artificial eye, uſually called a *camera optica* or *obſcura*, gives no admittance to any rays of light, but thoſe coming from the thing whoſe repreſentation is wanted, there reſults from them a picture of inexpreſſible force and brightneſs; and as nothing is more delightful to behold, ſo nothing can be more uſeful to ſtudy, than ſuch a picture. For, not to ſpeak of the juſtneſs of the contours, the exactneſs of the perſpective and of the chiaroſcura, which exceeds conception; the colours are of a vivacity and richneſs that nothing can excel; the parts which ſtand out moſt, and are moſt expoſed to the light, appear ſurpriſingly looſe and reſplendent; and this looſeneſs and reſplendency declines gradually, as the parts themſelves ſink in, or retire from the light. The ſhades are ſtrong without harſhneſs, and the contours preciſe without being ſharp. Whereever any reflected light falls, there appears, in conſequence of it, an infinite variety of tints, which, without this contrivance, it would be impoſſible to diſcern. Yet there prevails ſuch a harmony amongſt all the colours of the piece, that ſcarce any one of them can be ſaid to claſh with another.

After all, it is no way ſurpriſing, that we ſhould, by means of this contrivance, diſcover, what otherwiſe we might juſtly deſpair of ever being acquainted with. We cannot look directly at any object that is not ſurrounded by ſo many others, all darting their rays together into our eyes, that it is impoſſible we ſhould diſtinguiſh all the different modulations of its light and colours. At leaſt we can only ſee them in ſo dull and confuſed a manner, as not to be able to determine any thing preciſely about them. Whereas, in the camera obſcura, the viſual faculty is brought wholly to bear upon the object before it; and the light of every other object is, as it were, perfectly extinguiſhed.

Another moſt aſtoniſhing perfection in pictures of this kind is, the diminution of the ſize, and of the intenſeneſs of light and colour, of the objects and all their parts, in proportion to their diſtance from the eye. At a greater diſtance, the colours appear more faint, and the contours more obſcure. The ſhades, likewiſe, are a great deal weaker in a leſs or more remote light. On the other hand, thoſe objects, which are largeſt in themſelves, or lie neareſt to the eye, have the moſt exact contours, the ſtrongeſt ſhades, and the brighteſt colours: all which qualities are requiſite to form that kind of perſpective which is called *aerial;* as though the air between the eye and external objects, not only veiled them a little, but in ſome ſort gnawed and preyed upon them. This kind of perſpective conſtitutes a principal part of that branch of painting, which regards the foreſhortening of figures, and likewiſe the bringing them forward, and throwing them back in ſuch a manner as to make us loſe ſight of the ground upon which they are drawn. It is, in a word, this kind of perſpective, from which, aſſiſted by linear perſpective, ariſe

Dolco coſe a vedere, e dolci inganni;
“ Things ſweet to ſee, and ſweet deceptions.”

Nothing proves this better than the camera obſcura, in which nature paints the objects which lie near the eye, as it were, with a hard and ſharp pencil, and thoſe at a diſtance with a ſoft and blunt one.

The beſt modern painters among the Italians have availed themſelves greatly of this contrivance; nor is it poſſible they ſhould have otherwiſe repreſented things ſo much to the life. It is probable, too, that ſeveral of the Tramontane maſters, conſidering their ſucceſs in expreſſing the minuteſt objects, have done the ſame. Every one knows of what ſervice it has been to Spagnoletto of Bologna, ſome of whoſe pictures have a grand and moſt wonderful effect. We once happened to be preſent where a very able maſter was ſhewn this machine for the firſt time. It is impoſſible to expreſs the pleaſure he took in examining it. The more he conſidered it, the more he ſeemed to be charmed with it. In ſhort, after trying it a thouſand different ways, and with a thouſand different models, he candidly confeſſed, that nothing could compare with the pictures of ſo excellent and inimitable a maſter. Another, no leſs eminent, has given it as his opinion, that an academy, with no other furniture than the book of da Vinci, a critical account of the excellencies of the capital painters, the caſts of the fineſt Greek ſtatues, and the pictures of the camera obſcura, would alone be ſufficient to revive the art of painting. Let the young painter, therefore, begin as early as poſſible to ſtudy theſe divine pictures, and ſtudy them all the days of his life, for he never will be able ſufficiently to contemplate them. In ſhort, painters ſhould make the ſame uſe of the camera obſcura which naturaliſts and aſtronomers make of the microſcope and teleſcope; for all theſe inſtruments equally contribute to make known and repreſent nature.

Sect. VII. *Of Drapery.*

10. Drapery is one of the moſt important branches of the whole art, and accordingly demands the greateſt attention and ſtudy. It ſeldom happens that a painter has nothing but naked figures to repreſent; nay, his ſubjects generally conſiſt of figures clothed from head to foot. Now the flowing of the folds in every garment depends chiefly upon the relief of the parts that lie under it. A certain author, we forget his name, obſerves, that as the inequalities of a ſurface are diſcoverable by the inequalities in the water that runs over it, ſo the poſture and ſhape of the members muſt be diſcernible by the folds of the garment that covers them. Thoſe idle windings and gatherings, with which ſome painters have affected to cover their figures, make the clothes made up of them look as if the body had fled from under them, and left nothing in its place but a heap of empty bubbles, fit emblems of the brain that conceived them. As from the trunk of a tree there iſſue here and there boughs of various forms, ſo from one miſtreſs-fold there always flow many leſſer ones: and as it is on the quality of the tree that the elegance, compactneſs, or openneſs of its branches chiefly depends; it is, in like manner, by the quality of the ſtuff of which a garment is made, that the number, order, and ſize of its folds muſt be determined. To ſum up all in two words, the drapery ought to be natural and eaſy, ſo as to ſhow what ſtuff it is, and what parts it covers. It ought, as a certain author expreſſes it, to cover the body, as it were merely to ſhow it.

It was formerly the cuſtom with ſome of our maſters to draw all their figures naked, and then drape them; from the ſame principle that they firſt drew the ſkeletons of their figures, and afterwards covered them with muſcles. And it was by proceeding in this manner that they attained to ſuch a degree of truth in expreſ-

Of Landſcape.

ſing the folds of their drapery, and the joints and direction of the principal members that lay under it, ſo as to exhibit in a moſt ſtriking manner, the attitude of the perſon to whom they belonged. That the ancient ſculptors clothed their ſtatues with equal truth and grace, appears from many of them that are ſtill in being; particularly a Flora lately dug up in Rome, whoſe drapery is executed with ſo much judgment, and in ſo grand and rich a ſtyle, that it may vie with the fineſt of their naked ſtatues, even with the Venus of Medicis. The ſtatues of the ancients had ſo much beauty when naked, that they retained a great deal when clothed. But here it muſt be conſidered, that it was uſual with them to ſuppoſe their originals clothed with wet garments, and of an extreme fineneſs and delicacy, that, by lying cloſe to the parts, and in a manner clinging to them, they might the better ſhow what theſe parts were. For this reaſon a painter is not to confine himſelf to the ſtudy of the ancient ſtatues, leſt he ſhould contract a dry ſtyle, and even fall into the ſame faults with ſome great maſters who, accuſtomed to drape with ſuch light ſtuffs as ſit cloſe to the body, have afterwards made the coarſeſt lie in the ſame manner, ſo as plainly to exhibit the muſcles underneath them. It is therefore proper to ſtudy nature herſelf, and thoſe modern maſters who have come neareſt to her in this branch; ſuch as Paolo Veroneſe, Andrea del Sarto, Rubens, and above all, Guido Reni. The flow of their drapery is ſoft and gentle; and the gatherings and plaits are ſo contrived, as not only not to hide the body, but to add grace and dignity to it. Their gold, ſilk, and woollen ſtuffs, are ſo diſtinguiſhable one from another, by the quality of their ſeveral luſtres, and the peculiar light and ſhade belonging to each, but above all by the form and flow of their folds, that the age and ſex of their figures are hardly more diſcoverable by their faces. Albert Durer is another great maſter in this branch, inſomuch that Guido himſelf was not aſhamed to ſtudy him. There are ſtill extant ſeveral drawings made with the pen by this great man, in which he has copied whole figures from Albert, and ſcrupulouſly retained the flow of his drapery as far as his own peculiar ſtyle, leſs harſh and ſharp, but more eaſy and graceful, would allow. It may be ſaid that he made the ſame uſe of Albert, that our modern writers ought to make of the beſt authors of the 13th century.

SECT. VIII. *Of Landſcape and Architecture.*

11. WHEN our young painter has made a ſufficient progreſs in thoſe principal branches of his art, the deſigning, perſpective, colouring, and drapery of human figures, he ſhould turn his thoughts to landſcape and architecture: for, by ſtudying them, he will render himſelf univerſal, and qualified to undertake any ſubject; ſo as not to reſemble certain literati, who, tho' great maſters in ſome articles, are mere children in every thing elſe.

The moſt eminent landſcape painters are Pouſſin, Loreneſe, and Titian.

Pouſſin was remarkable for his great diligence. His pieces are quite exotic and uncommon; being ſet off with buildings in a beautiful but ſingular ſtyle; and with learned epiſodes, ſuch as poets reciting their verſes to the woods, and youths exerciſing themſelves in the ſeveral gymnaſtic games of antiquity; by which it plainly appears, that he was more indebted for his ſubjects to the deſcriptions of Pauſanias, than to nature and truth.

Architecture.

Loreneſe applied himſelf chiefly to expreſs the various phenomena of light, eſpecially thoſe perceivable in the heavens. And, thanks to the happy climate of Rome, where he ſtudied and exerciſed his talents, he has left us the brighteſt ſkies, and the richeſt and moſt gloriouſly cloud-tipt horizons that can be well conceived. Nay, the ſun himſelf, which, like the Almighty, can be repreſented merely by his effects, has ſcarce eſcaped his daring and ambitious pencil.

Titian, the great confident of nature, is the Homer of landſcape. His ſcenes have ſo much truth, ſo much variety, and ſuch a bloom in them, that it is impoſſible to behold them, without wiſhing, as if they were real, to make an excurſion into them. And perhaps the fineſt landſcape that ever iſſued from mortal hands, is the back ground of his *Martyrdom of St Peter;* where by the difference between the bodies and the leaves of his trees, and the diſpoſition of their branches, one immediately diſcovers the difference between the trees themſelves; where the different ſoils are ſo well expreſſed, and ſo exquiſitely clothed with their proper plants, that a botaniſt has much ado to keep his hands from them. See Part II. Sect. ii.

Paolo Veroneſe is in architecture, what Titian is in landſcape. To excel in landſcape, we muſt, above all things, ſtudy nature. To excel in architecture, we muſt chiefly regard the fineſt works of art; ſuch as the fronts of ancient edifices, and the fabrics of thoſe moderns who have beſt ſtudied and beſt copied antiquity. Next to Brunelleſchi and Alberti, who were the firſt revivers of architecture, came Bramante, Giulio Romano, Sanſovino, Sanmicheli, and laſtly Palladio, whoſe works the young painter ſhould above all the reſt diligently ſtudy and imprint deeply on his mind. Nor is Vignola to be forgot; for ſome think he was a more ſcrupulous copier of antiquity, and more exact, than Palladio himſelf, inſomuch that moſt people conſider him as the firſt architect among the moderns. For our part, to ſpeak of him, not as fame, but as truth ſeems to require, we cannot help thinking, that rather than break through the generality of the rules contrived by him to facilitate practice, he has in ſome inſtances deviated from the moſt beautiful proportions of the antique, and is rather barren in the diſtribution and diſpoſition of certain members. Moreover, the extraordinary height of his pedeſtals and corniſhes hinders the column from ſhowing in the orders deſigned and employed by him, as it does in thoſe of Palladio. Amongſt that great variety of proportions to be met with in ancient ruins, Palladio has been extremely happy in chooſing the beſt. His profiles are well contraſted, yet eaſy. All the parts of his buildings hang well together. Grandeur, elegance, and beauty, walk hand in hand in them. In ſhort, the very blemiſhes of Palladio, who was no ſlave to conveniency, and ſometimes perhaps was too profuſe in his decorations, are pictureſque. And we may reaſonably believe, that it was by following ſo great a maſter, whoſe works he had continually before his eyes, that Paolo Veroneſe formed that fine and maſterly taſte which enabled him to embelliſh his compoſitions with ſuch beautiful ſtructures.

SECT. IX. *Of the Coſtume.*

12. THE ſtudy of architecture cannot fail, in another reſpect, of being very uſeful to the young painter, inaſmuch as it will bring him acquainted with the form of the temples, thermæ, baſilics, theatres, and other buildings of the Greeks and Romans. Beſides, from the baſſo-relievos with which it was cuſtomary to adorn theſe buildings, he may gather, with equal delight and profit, the nature of their ſacrifices, arms, military enſigns, and dreſs. The ſtudy of landſcape, too, will render familiar to him the form of the various plants peculiar to each ſoil and climate, and ſuch other things as ſerve to characteriſe the different regions of the earth. Thus by degrees he will learn what we call *coſtume*, one of the chief requiſites in a painter; ſince, by means of it, he may expreſs with great preciſion the time and place in which his ſcenes are laid.

The Roman ſchool has been exceedingly chaſte in this branch. So was the French, as long as it continued under the influence and direction of Pouſſin, whom we may juſtly ſtyle the *Learned Painter;* whereas the Venetian ſchool has been to the laſt degree careleſs, not to ſay licentious. Titian made no difficulty of introducing in an *Ecce Homo* of his, pages in a Spaniſh garb, and the Auſtrian Eagle on the ſhields of the Roman ſoldiers. It is true indeed, that once he placed in the back ground of a *Crowning-with-Thorns*, a buſt carrying the name of the emperor Tiberius, under whom our Saviour ſuffered: but it is likewiſe true, that, as if he thought it unbecoming a painter to pay any regard to ſuch minutiæ of learning and the coſtume, he ſhewed himſelf perfectly indifferent about them in all his other works. Tintoret, in a *Fall of Manna*, has armed his figures with muſquets. And Paolo Veroneſe, in a *Laſt-Supper*, preſents us with Swiſs, Levantine, and other ſtrange figures. In ſhort, he has been ſo careleſs in this way, that his pieces have been often conſidered as ſo many beautiful maſquerades.

It is impoſſible to expreſs how much a picture ſuffers by ſuch looſeneſs and fancy, and ſinks as a baſtard of the art in the eſteem of good judges. Some people, indeed, are of opinion that ſo ſcrupulous an obſervance of the coſtume is apt to hurt pictures, by depriving them of a certain air of truth ariſing, they think, from thoſe features and habits to which we are accuſtomed; and which are therefore apt to make a greater impreſſion, than can be expected from things drawn from the remote ſources of antiquity: adding withal, that a certain degree of licence has ever been allowed thoſe artiſts who in their works muſt make fancy their chief guide. See, ſay they, the Greeks; that is, the maſters of Raphael and Pouſſin themſelves. Do they ever trouble their heads about ſuch niceties? The Rhodian ſtatuaries, for example, have not ſcrupled to repreſent Laocoon naked; that is, the Prieſt of Apollo naked in the very act of ſacrificing to the gods, and that too in preſence of a whole people, of the virgins and matrons of Ilium. Now, continue they, if it was allowable in the ancient ſtatuaries to neglect probability and decency to ſuch a degree, to have a better opportunity of diſplaying their ſkill in the anatomy of the human body; why may it not be allowable in modern painters, the better to attain the end of their art, which is deception, to depart now and then a little from the ancient manners and the too rigorous laws of the coſtume? But theſe reaſons, we beg leave to obſerve, are more abſurd than they are ingenious. What! are we to draw concluſions from an example, which, far from deciding the diſpute, gives occaſion to another? The learned are of opinion, that thoſe Rhodian maſters would have done much better, had they looked out for a ſubject in which, without offending ſo much againſt truth, and even probability, they might have had an equal opportunity of diſplaying their knowledge of the naked. And certainly no authority or example whatever, ſhould tempt us to to do any thing contrary to what both decency and the reaſon of things require, unleſs we intend, like Carpioni, to repreſent

Sogni d'infermi, e fole di romanzi.
"The dreams of ſick men, and the tales of fools."

No: a painter, the better to attain the end of his art, which is deception, ought carefully to avoid mixing the antique with the modern, the domeſtic with the foreign; things, in ſhort, repugnant to each other, and therefore incapable of gaining credit. A ſpectator will never be brought to conſider himſelf as actually preſent at the ſcene, the repreſentation of which he has before him, unleſs the circumſtances which enter it perfectly agree among themſelves, and the field of action, if we may uſe the expreſſion, in no ſhape belies the action itſelf. For inſtance, the circumſtances, or, if you pleaſe, the acceſſories, in a *Finding of Moſes*, are not, ſurely, to repreſent the borders of a canal planted with rows of poppies, and covered with country-houſes in the European taſte; but the banks of a great river ſhaded with cluſters of palm-trees, with a Sphinx or an Anubis in the adjacent fields, and here and there in the back-ground a towering pyramid. And indeed the painter, before he takes either canvas or paper in hand, ſhould on the wings of fancy tranſport himſelf to Egypt, to Thebes, or to Rome; and ſummoning to his imagination the phyſiognomy, the dreſs, the plants, the buildings, ſuitable to his ſubject, with the particular ſpot he has choſen to lay his ſcene, ſo manage his pencil, as, by the magic of it, to make the enraptured ſpectators fancy themſelves there along with him.

SECT. X. *Of Invention.*

13. As the operations of a general ſhould, all, ultimately tend to battle and conqueſt; ſo ſhould all the thoughts of a painter to perfect invention. Now, the ſtudies which we have been hitherto recommending, will prove ſo many wings by which he may raiſe himſelf, as it were, from the ground, and ſoar on high, when deſirous of trying his ſtrength this way, and producing ſomething from his own fund. Invention is the finding out probable things, not only ſuch as are adapted to the ſubject in hand, but ſuch, beſides, as by their ſublimity and beauty are moſt capable of exciting ſuitable ſentiments in the ſpectator, and of making him, when they happen to be well executed, fancy that it is the ſubject itſelf in its greateſt perfection, and not a mere repreſentation of it, that he has before him. We do not ſay true things, but probable things; becauſe probability or veriſimilitude is, in fact, the truth of thoſe arts which have the fancy for their object. It is, indeed, the buſineſs and duty of both naturaliſts and hiſtorians, to draw objects as they find them, and

repreſent them with all thoſe imperfections and blemiſhes, to which, as individuals, they are ſubject. But an ideal painter, and ſuch alone is a true painter, reſembles the poet: inſtead of copying, he imitates; that is, he works with his fancy, and repreſents objects endued with all that perfection which belongs to the ſpecies and may be conceived in the archetype.

" 'Tis *nature all, but nature methodiſed;*"

ſays an eminent poet, ſpeaking of poetry: And the ſame may be ſaid of painting; but it is nature methodized, and made perfect. Inſomuch, that the circumſtances of the action, exalted and ſublimed to the higheſt degree of beauty and boldneſs they are ſuſceptible of, may, though poſſible, have never happened exactly ſuch as the painter fancies and thinks proper to repreſent them. Thus, the piety of Æneas, and the anger of Achilles, are things ſo perfect in their kind, as to be merely probable. And it is for this reaſon that poetry, which is only another word for invention, is more philoſophical, more inſtructive, and more entertaining, than hiſtory.

Here it is proper to obſerve, what great advantages the ancient had over the modern painters. The hiſtory of the times they lived in, fraught with great and glorious events, was to them a rich mine of the moſt noble ſubjects, which, beſides, often derived no ſmall ſublimity and pathos from the mythology upon which their religion was founded. So far were their gods from being immaterial, and placed at an infinite diſtance above their worſhippers; ſo far was their religion from recommending humility, penance, and ſelf-denial, that, on the contrary, it appeared calculated merely to flatter the ſenſes, inflame the paſſions, and poiſon the fancy. By making the gods partake of our nature, and ſubjecting them to the ſame paſſions, it gave man hopes of being able to mix with thoſe who, though greatly above him, reſembled him, notwithſtanding, in ſo many reſpects. Beſides, thoſe deities of theirs were in a manner viſible, and to be met at every ſtep. The ſea was crowded with Tritons and Nereids, the rivers with Naiads, and the mountains with Dryads. The woods ſwarmed with Fauns and Nymphs, who, in theſe obſcure retreats, ſought an aſylum for their ſtolen embraces. The moſt potent empires, the moſt noble families, the moſt celebrated heroes, all derived their pedigree from the greater divinities. Nay, gods intereſted themſelves in all the concerns of mankind. Apollo, the god of long arrows, ſtood by the ſide of Hector in the fields of Troy, and inſpired him with new ſtrength and courage to batter down the walls and burn the ſhips of the Greeks. Theſe, on the other hand, were led on to the fight and animated by Minerva, preceded by Terror, and followed by Death. Jove nods, his divine locks ſhake on his immortal head; Olympus trembles. With that countenance, which allays the tempeſt, and reſtores ſerenity to the heavens, he gathers kiſſes from the mouth of Venus, the delight of gods and of men. Among the ancients, every thing ſported with the fancy; and in thoſe works which depend entirely on the imagination, ſome of our greateſt maſters have thought they could not do better than borrow from the Pagans, if we may be allowed to ſay it, their pictures of Tartarus, in order to render their own drawings of hell more ſtriking.

After all, there have not been wanting able inventors in painting among the moderns. Michael Angelo, notwithſtanding the depth and boldneſs of his own fancy, is not aſhamed, in ſome of his compoſitions, to *Dantize*; as Phidias and Apelles may be ſaid formerly to have *Homerized*. Raphael, too, tutored by the Greeks, has found means, like Virgil, to extract the quinteſſence of truth; has ſeaſoned his works with grace and nobleneſs, and exalted nature, in a manner, above herſelf, by giving her an aſpect more beautiful, more animating, and more ſublime, than ſhe is, in reality, accuſtomed to wear. In point of invention, Domenichino and Annibal Caracci come very near Raphael, eſpecially in the pieces painted by them in Rome; nor does Pouſſin fall very ſhort of him in ſome of his pictures, particularly in his *Eſther before Ahauſuerus*, and his *Death of Germanicus*, the richeſt jewel belonging to the Barberine family. Of all the painters who have acquired any extraordinary degree of reputation, no one ſtudied leſs to ſet off his pieces by bold and beautiful circumſtances, or was more a ſtranger to what is called *poetical perfection*, than Jacopo Baſſano. Among the numberleſs inſtances we could produce of his careleſſneſs this way, let it ſuffice to mention a *Preaching of St Paul* painted by him in a place, near that of his birth, called *Maroſtega*. Inſtead of repreſenting the apoſtle full of a divine enthuſiaſm, as Raphael has done, and thundering againſt the ſuperſtitions of the heathen in an aſſembly of Athenians; inſtead of exhibiting one of his auditors ſtruck to the quick, another perſuaded, a third inflamed; he makes him hold forth, in a village of the Venetian ſtate, to a parcel of poor peaſants and their wives, who take not the leaſt notice of him; the women eſpecially, who ſeem to mind nothing but the country labours in which he had found them employed. After all, this is an admirable piece; and would be a perfect one, had the painter not diſgraced it ſo much by the poverty of his ideas.

With regard to invention, painting and poetry reſemble each other ſo much in many other reſpects, beſides that of combining in every action all the beauty and elegance it will admit, that they well deſerve the name of *ſiſter arts*. They differ, however, in one point, and that too of no ſmall importance. It is this. The poet, in the repreſentation of his ſtory, relates what has already happened, prepares that which is ſtill to come, and ſo proceeds, ſtep by ſtep, through all the circumſtances of the action; and, to operate the greater effect on his hearers, avails himſelf of the ſucceſſion of time and place. The painter, on the contrary, deprived of ſuch helps, muſt be content to depend upon one ſingle moment. But what a moment! A moment, in which he may conjure up, at once, to the eyes of the ſpectator, a thouſand objects; a moment, teeming with the moſt beautiful circumſtances that can attend the action; a moment, equivalent to the ſucceſſive labours of the poet. This the works of the greateſt maſters, which are every where to be ſeen, ſufficiently evince; among others, the *St Paul at Lyſtra*, by Raphael, whom it is impoſſible not to praiſe as often as this picture is mentioned. In order to give the ſpectator a thorough inſight into the ſubject of this piece, the painter has placed, in the front of it, the cripple already reſtored to his limbs by the Apoſtle, fired with gratitude towards his benefactor, and exciting his countrymen to yield him all kinds of honour. Round the cripple are ſome figures lifting up the ſkirts of his coat, in order to look at the legs reduced to their proper ſhape, and acknowledging by geſtures full of aſtoniſhment the reality of the miracle; an invention, ſays a certain author, a profeſſed admirer of antiquity, which might have been propoſed as an example in the happieſt age of Greece.

Webb, dial. 7.

We have another ſhining inſtance of the power of painting to introduce a great variety of objects on the ſcene at the ſame time, and of the advantage it has in this reſpect over poetry, in a drawing by the celebrated la Fage, which, like many other pieces of his, has not as yet been engraved, though worthier, perhaps, of that honour than any other performance of the kind. This drawing repreſents the deſcent of Æneas into hell. The field is the dark caverns of Pluto's kingdom, through the middle of which creeps ſlowly the muddy and melancholy Acheron. Nearly in the centre of the piece appears Æneas with the golden bough in his hand, and with an air of aſtoniſhment at what he ſees. The Sybil, who accompanies him, is anſwering the queſtions which he aſks her. The perſonage there is the ferryman of the pitchy lake, by which even the gods themſelves are afraid to ſwear. Thoſe, who, crowding in to the banks of the river, numberleſs as the leaves ſhaken off the trees by autumnal blaſts, expreſs, with outſtretched hands, an impatience to be ferried to the oppoſite ſhore, are the unhappy manes, who, for want of burial, are unqualified for that happineſs. Charon, accordingly, is crying out to them, and with his lifted-up oar driving them from his boat, which has already taken in a number of thoſe who had been honoured with the accuſtomed funeral rites. Behind Æneas and the Sybil we diſcover a confuſed groupe of wretched ſouls, lamenting bitterly their misfortune in being denied a paſſage; two of them wrapped up in their clothes; and, in a fit of deſpair, ſunk upon a rock. Upon the firſt lines of the piece ſtands a third groupe of uninhumed ſhades, Leucaſpes, Orontes, and, in the midſt of them, the good old Palinurus, formerly maſter and pilot of the hero's own veſſel, who with joined hands moſt earneſtly deſires to be taken along with him into the boat, that, after death, at leaſt, he may find ſome repoſe, and his dead body no longer remain the ſport of winds and waves. Thus, what we ſee ſcattered up and down in many verſes by Virgil, is here, as it were, gathered into a focus, and concentered by the ingenious pencil of the painter; ſo as to form a ſubject well worthy of being expoſed, in more ſhapes than one, to the eyes of the public.

When a painter takes a ſubject in hand, be it hiſtorical, be it fabulous, he ſhould carefully peruſe the books which treat of it, imprint well on his mind all the circumſtances that attend it, the perſons concerned in it, and the paſſions with which they muſt have been ſeverally animated; not omitting the particulars of time and place. His next buſineſs is to create it, as it were, anew, obſerving the rules already laid down for that purpoſe: From what is true, chooſing that which is moſt ſtriking; and clothing his ſubject with ſuch acceſſory circumſtances and actions, as may render it more conſpicuous, pathetic, and noble, and beſt diſplay the powers of the inventive faculty. But, in doing this, great diſcretion is requiſite; for, let his imagination grow ever ſo warm, his hand is never to execute any thing that is not fully approved by his judgment. Nothing low or vulgar ſhould appear in a lofty and noble argument; a fault, of which ſome of the greateſt maſters, even Lampieri and Pouſſin, have been now and then guilty.

The action muſt be one, the place one, the time one. We need not ſay any thing of thoſe painters, who, like the writers of the Chineſe and Spaniſh theatre, cram a variety of actions together, and ſo give us, at once, the whole life of a man. Such blunders, it is preſumed, are too groſs to be feared at preſent. The politeneſs and learning of the age ſeem to demand conſiderations of a more refined nature; ſuch as, that the epiſodes introduced in the drama of a picture, the better to fill and adorn it, ſhould be not only beautiful in themſelves, but indiſpenſably requiſite. The games celebrated at the tomb of Anchiſes in Sicily, have a greater variety in them, and more ſources of delight, than thoſe that had been before celebrated at the tomb of Patroclus under the walls of Troy. The arms forged by Vulcan for Æneas, if not better tempered, are at leaſt better engraved than thoſe which the ſame god had forged ſeveral ages before for Achilles. Nevertheleſs, in the eyes of judges, both the games and the arms of Homer are more pleaſing than thoſe of Virgil, becauſe the former are more neceſſary in the Iliad, than the latter in the Æneid. Every part ſhould agree with, and have a relation to, the whole: Unity ſhould reign even in variety; for in this, beauty conſiſts. This is a fundamental maxim in all the arts whoſe object it is to imitate the works of nature.

Pictures often borrow no ſmall grace and beauty from the fictions of poetry. Albani has left us, in ſeveral of his works, ſufficient proofs of the great ſhare the belles letters had in refining his taſte. But Raphael, above all others, may, in this branch too, be conſidered as a guide and maſter. To give but one inſtance out of many; what a beautiful thought was it to repreſent the river himſelf, in a *Paſſage of Jordan*, ſupporting his waters with his own hands, in order to open a way to the army of the Iſraelites! Nor has he diſplayed leſs judgment in reviving, in his deſigns engraved by Agoſtino of Venice, the little loves of Aëtius, playing with the arms of Alexander, conquered by the beauty of Roxana.

Among the ancients, Apelles and Parrhaſius were thoſe who diſtinguiſhed themſelvs moſt in allegorical ſubjects, in which the inventive faculty ſhows itſelf to the greateſt advantage; the firſt by his picture of Calumny †, the ſecond by that of the Genius of the Athenians *. The ancient painter called *Galaton*, gave likewiſe a fine proof of his genius in this branch, by repreſenting a great number of poets greedily quenching their thirſt in the waters guſhing from the mouth of the ſublime Homer. And to this allegory, according to Guigni, Pliny ‡ has an eye, when he calls that prince of poets, the *fountain of wits*. But it is, after all, no way ſurpriſing that we ſhould often meet ſuch fine flights of fancy in the ancient artiſts. They were not guided in their works by a blind practice: they were men of polite education; converſant with the letters of the age in which they lived; and the companions, rather than the ſervants, of the great

Webb, dial. 4.

---

† See *Lucian* upon Calumny; and *Carlo Dati*, in the *Life of Apelles*, note 20.

* *C. Plinii Nat. Hiſt.* lib. xxxv. c. 10.

‡ Ibid. lib. xvii. cap. 5.

men who employed them. The fineſt allegorical painter among the moderns was Rubens; and he was, accordingly, much celebrated for it. The beſt critics, however, find fault with his uniting in Luxemburg gallery, the queen-mother, in council, with two cardinals and Mercury. Nor is there leſs impropriety in his making Tritons and Nereids, in another piece of the ſame gallery, ſwim to the queen's veſſel through the galleys of the knights of St Stephen. Such freedoms are equally diſguſtful with the prophecies of Sannazaro's Proteus, concerning the myſtery of the incarnation; or the Indian kings of Camœns, reaſoning with the Portugueſe on the adventures of Ulyſſes.

Polym. dial. 18.

The beſt modern performances in pictureſque allegory are, certainly, thoſe of Pouſſin; who availed himſelf, with great diſcretion and judgment, of the vaſt treaſures with which, by a cloſe ſtudy of the ancients, he had enriched his memory. On the other hand, le Brun, his countryman, has been very unhappy this way. Ambitious to have every thing his own, inſtead of allegories, he has filled the gallery of Verſailles with enigmas and riddles, of which none but himſelf was qualified to be the Oedipus. Allegory muſt be ingenious, it is true; but then it muſt be equally perſpicuous; for which reaſon, a painter ſhould avoid all vague and indeterminate alluſions, and likewiſe thoſe to hiſtory and heathen mythology which are too abſtruſe to be underſtood by the generally of ſpectatos. The beſt way, perhaps, to ſymbolize moral and abſtract things, is to repreſent particular events: as Caracci did, by advice of Monſignore Agucchi, in the Farneſian palace. For example, what can better expreſs a hero's love towards his country, than the virtuous Decius conſecrating himſelf boldly to the infernal gods, in order to ſecure victory to his countrymen over their enemies? What finer emblems can we deſire, of emulation, and an inſatiable thirſt for glory, than Julius Cæſar weeping before the ſtatue of Alexander in the temple of Hercules at Gades? of the inconſtancy of fortune, than Marius ſitting on the ruins of Carthage, and receiving, inſtead of the acclamations of an army joyfully ſaluting him imperator, orders from a lictor of Sextilius to quit Africa? of indiſcretion, than Candaules, who, by ſhewing the naked beauties of his wife to his friend Giges, kindled a paſſion that ſoon made him repent his folly? Such repreſentations as theſe require no comment; they carry their explanation along with them. Beſides, ſuppoſing, and it is the worſt we can ſuppoſe, that the painter's aim in them ſhould happen not to be underſtood, his piece would ſtill give delight. It is thus that the fables of Arioſto prove ſo entertaining, even to thoſe who underſtand nothing of the moral couched under them; and likewiſe the Æneis, though all do not comprehend the alluſions and double intent of the poet.

See *Bellori's Life of Caracci.*

SECT. XI. *Of Diſpoſition.*

14. So much for invention. *Diſpoſition*, which may be conſidered as a branch of invention, conſiſts in the proper ſtationing of what the inventive faculty has imagined, ſo as to expreſs the ſubject in the moſt lively manner. The chief merit of diſpoſition may be ſaid to conſiſt in that diſorder, which, wearing the appearance of mere chance, is, in fact, the moſt ſtudied effect of art. A painter, therefore, is equally to avoid the dryneſs of thoſe ancients who always planted their figures like ſo many couples in a proceſſion, and the affectation of thoſe moderns who jumble them together as if they were met merely to fight and ſquabble. In this branch Raphael was happy enough to chooſe the juſt medium, and attain perfection. The diſpoſition of his figures is alway exactly ſuch as the ſubject requires. In the *Battle of Conſtantine*, they are confuſedly cluſtered with as much art, as they are regularly marſhalled in *Chriſt's commitment of the keys to St Peter* and conſtituting him prince of the apoſtles.

Let the inferior figures of a piece be placed as they will, the principal figure ſhould ſtrike the eye moſt, and ſtand out, as it were, from among the reſt. This may be effected various ways, as by placing it on the foremoſt lines, or in ſome other conſpicuous part of the piece; by exhibiting it, in a manner, by itſelf; by making the principal light fall upon it; by giving it the moſt reſplendent drapery; or, indeed, by ſeveral of theſe methods, nay, by all of them together. For, being the hero of the pictureſque fable, it is but juſt that it ſhould draw the eye to itſelf, and lord it, as it were, over all the other objects.

According to Leon Batiſta Alberti, painters ſhould follow the example of comic writers, who compoſe their fable of as few perſons as poſſible. For, in fact, a crowded picture is apt to give as much pain to the ſpectator, as a crowded road to the traveller.

Some ſubjects, it muſt be granted, require a number, nay, a nation, as it were, of figures. On theſe occaſions, it depends entirely on the ſkill of the painter to diſpoſe of them in ſuch a manner, that the principal ones may always make the principal appearance; and contrive matters ſo, that the piece be not overcrowded, or want convenient reſts and pauſes. He muſt, in a word, take care that his piece be full, but not charged. In this reſpect, the *Battles of Alexander* by Le Brun are maſter-pieces which can never be ſufficiently ſtudied; whereas nothing, on the other hand, can be more unhappy than the famous *Paradiſe* of Tintoret, which covers one entire ſide of the great council-chamber at Venice. It appears no better than a confuſed heap of figures, a ſwarm, a cloud, a chaos, which pains and fatigues the eye. What a pity it is that he did not diſpoſe this ſubject after a model of his own, now in the gallery of Bevilacqua at Verona! In this laſt, the ſeveral choirs of martyrs, virgins, biſhops, and other ſaints, are judiciouſly thrown into ſo many cluſters, parted here and there by a fine fleece of clouds; ſo as to exhibit the innumerable hoſt of heaven drawn up in a way that makes a moſt agreeable and glorious appearance. There goes a ſtory, to our purpoſe, of a celebrated maſter, who in a drawing of the Univerſal Deluge, the better to expreſs the immenſity of the waters that covered the earth, left a corner of his paper without figures. Being aſked, if he did not intend to fill it up: No, ſaid he; do not you ſee that my leaving it empty is what preciſely conſtitutes the picture?

The reaſon for breaking a compoſition into ſeveral groupes is, that the eye, paſſing freely from one object to another, may the better comprehend the whole. But the painter is not to ſtop here; for theſe groupes are, beſides, to be ſo artfully put together, as to form rich cluſters, give the whole compoſition a ſingular air of grandeur, and afford the ſpectator an opportunity of diſcerning the piece at a diſtance, and taking the whole in, as it were, at a ſingle glance. Theſe effects are greatly promoted by a due regard to the nature of colours, ſo as not to place together thoſe which are apt to pain by their oppoſition, or diſtract by their variety. They ſhould be ſo judiciouſly diſpoſed as to temper and qualify each other.

A proper uſe of the chiaroſcuro is likewiſe of great ſervice on this occaſion, The groupes are eaſily parted, and the whole picture acquires a grand effect, by introducing ſome ſtrong falls of ſhade, and, above all, one principal beam of light. This method has been followed with great ſucceſs by Rembrant in a famous picture of his, repreſenting the Virgin at the foot of the croſs on mount Calvary; the principal light darting upon her through a break of the clouds, while the reſt of the figures about her ſtand more or leſs in the ſhade. Tintoret, too, acquired great reputation, as well by that briſkneſs with which he enlivened his figures, as by his maſterly manner of ſhading them; and Polidoro de Caravaggio, though he ſcarce painted any thing but baſſo-relievos, was particularly famous for introducing with great ſkill the effects of the chiaroſcuro, a thing firſt attempted by Mantegna in his *Triumph of Julius Cæſar*. It is by this means that his compoſitions appear ſo ſtrikingly divided into different groupes, and, among their other perfections, afford ſo much delight thro' the beautiful diſpoſition that reigns in them.

In like manner, a painter, by the help of perſpective, eſpecially that called *ærial*, the oppoſition of local colours, and other contrivances which he may expect to hit upon by ſtudying nature, and thoſe who have beſt ſtudied her before him, will be able not only to part his groupes, but make them appear at different diſtances, ſo as to leave ſufficient paſſages between them.

But the greateſt caution is to be uſed in the purſuit of the methods here laid down; eſpecially in the management of the chiaroſcuro, that the effects attributed to light and ſhade, and to their various concomitants, may not run counter to truth and experience. This a capital point. For this purpoſe, a painter would do well to make, in little figures, as Tintoret and Pouſſin uſed to do, a model of the ſubject that he intends to repreſent, and then illuminate it by lamp or candle light. By this means he may come to know with certainty, if the chiaroſcuro, which he has formed in his mind, does not claſh with the reaſon of things. By varying the height and direction of his light, he may eaſily diſcover ſuch accidental effects as are moſt likely to recommend his performance, and ſo eſtabliſh a proper ſyſtem for the illuminating it. Nor will he afterwards find it a difficult matter to modify the quality of his ſhades, by ſoftening or ſtrengthening them, according to the ſituation of his ſcene, and the quality of the light falling upon it. If it ſhould happen to be a candle or lamp light ſcene, he would then have nothing to do but conſider his model well, and faithfully copy it.

In the next place, to turn a groupe elegantly, the beſt pattern is that of a bunch of grapes adopted by Titian. As, of the many grains that compoſe a bunch of grapes, ſome are ſtruck directly by the light, and thoſe oppoſite to them are in the ſhade, whilſt the intermediate ones partake of both light and ſhade in a greater or leſs degree; ſo, according to Titian, the figures of a groupe ſhould be ſo diſpoſed, that, by the union of the chiaroſcuro, ſeveral things may appear as it were but one thing. And in fact it is only from his having purſued this method, that we can account for the very grand effect of his pieces this way, in which it is impoſſible to ſtudy him too much.

The manneriſts, who do not follow nature in the track of the maſters juſt mentioned, are apt to commit many faults. The reaſon of their figures caſting their ſhades in this or that manner ſeldom appears in the picture, or at leaſt does not appear ſufficiently probable. They are, beſides, wont to treſpaſs all bounds in ſplaſhing their pieces with light, that is, in enlivening thoſe parts which we uſually term the deafs of a picture. This method, no doubt, has ſometimes a very fine effect; but it is, howevet, to be uſed with no ſmall diſcretion, as otherwiſe the whole loſes that union, that pauſe, that majeſtic ſilence, as Caracci uſed to call it, which affords ſo much pleaſure. The eye is not leſs hurt by many lights ſcattered here and there over a picture, than the ear is by the confuſed noiſe of different perſons ſpeaking all together in an aſſembly.

Hogarth's Anal. of Beauty.

Guido Reni, who has imparted to his paintings that gaiety and ſplendour in which he lived, ſeems enamoured with a bright and open light; whereas Michael Angelo da Caravaggio, who was of a ſullen and ſavage diſpoſition, appears fondeſt of a gloomy and clouded ſky: ſo that neither of them were qualified to handle indifferently all ſubjects. The chiraoſcuro may likewiſe prove of great ſervice to a painter in giving his compoſition a grand effect; but, nevertheleſs, the light he chooſes muſt be adapted to the ſituation of the ſcene where the action is laid: nor would he be leſs faulty, who in a grotto or cavern, where the light entered by a chink, ſhould make his ſhades ſoft and tender, than him who ſhould repreſent them ſtrong and bold in an open ſky-light.

But this is not, by many, the only fault which manneriſts are apt to be guilty of in hiſtorical pieces, and particularly in the diſpoſition of their figures. To ſay nothing of their favourite groupe of a woman lying on the ground with one child at her breaſt, and another playing about her, and the like, which they generally place on the firſt lines of their pieces; nor of thoſe half-figures in the back ground peeping out from the hollows contrived for them: they make a common practice of mixing naked with clothed figures; old men with young; placing one figure with its face towards you, and another with its back; they contraſt violent motions with languid attitudes, and ſeem to aim at oppoſition in every thing; whereas oppoſitions never pleaſe, but when they ariſe naturally from the ſubject, like antitheſes in a diſcourſe.

As to foreſhortened figures, too much affectation in uſing or avoiding them is equally blameable. The attitudes had better be compoſed than otherwiſe. It very ſeldom happens that there is any occaſion for making them ſo impetuous as to be in danger of loſing their equilibrium; a thing too much practiſed by ſome painters.

Expreſſion of the Paſſions.

In regard to drapery, equal care ſhould be taken to avoid that poverty, which makes ſome maſters look as if, through mere penury, they grudged clothes to their figures; and that profuſion which Albani imputed to Guido, ſaying, that he was rather a tailor than a painter. The ornaments of dreſs ſhould be uſed with great ſobriety; and it will not be amiſs to remember what was once ſaid to an ancient painter: "I pity you greatly; unable to make Helen handſome, you have taken care to make her fine."

Let the whole, in a word, and all the different parts of the diſpoſition, poſſeſs probability, grace, coſtume, and the particular character of what is to be repreſented. Let nothing look like uniformity of manner; which does not appear leſs in the compoſition than it does in colouring, drapery, and deſign; and is, as it were, that kind of accent, by which painters may be as readily diſtinguiſhed as foreigners are, by pronouncing in the ſame manner all the different languages they happen to be acquainted with.

Sect. XII. *Of the Expreſſion of the Paſſions.*

15. That language which above all others a painter ſhould carefully endeavour to learn, and from nature herſelf, is the language of the paſſions. Without it the fineſt works muſt appear lifeleſs and inanimate. It is not enough for a painter to be able to delineate the moſt equiſite forms, give them the moſt graceful attitudes, and compoſe them well together; it is not enough to dreſs them out with propriety, and in the moſt beautiful colours; it is not enough, in fine, by the powerful magic of light and ſhade to make the canvas vaniſh. No; he muſt likewiſe know how to clothe his figures with grief, with joy, with fear, with anger; he muſt, in ſome ſort, write on their faces what they think and what they feel; he muſt give them life and ſpeech. It is indeed in this branch that painting truly ſoars, and in a manner riſes ſuperior to itſelf; it is in this branch ſhe makes the ſpectator apprehend much more than what ſhe expreſſes,

The means employed in her imitations by painting, are the circumſcription of terms, the chiaroſcuro, and colours; all which appear ſolely calculated to ſtrike the viſual faculty. Notwithſtanding which, ſhe contrives to repreſent hard and ſoft, rough and ſmooth ſurfaces, which are objects of the touch; and this by means of certain tints, and a certain chiaroſcuro, which has a different look in marble, in the bark of trees, in downy and delicate ſubſtances. Nay, ſhe contrives to expreſs ſound and motion, by means of light and ſhade, and certain particular configurations. In ſome landſcapes of Diderich, we almoſt hear the water murmur, and ſee it tremble along the ſides of the river, and of the boats upon it. In the *Battle* of Burgogne we are really apt to fancy that the trumpet ſounds; and we ſee the horſe, who has thrown his rider, ſcamper along the plain. But what is ſtill more wonderful, painting, in virtue of her various colours and certain particular geſtures, expreſſes even the ſentiments and moſt hidden affections of the ſoul, and renders her viſible, ſo as to make the eye not only touch and hear, but even kindle into paſſion, and reaſon.

Many have written, and amongſt the reſt the famous le Brun, on the various changes, that, according to the various paſſions, happen in the muſcles of the face, which is, as it were, the dumb tongue of the ſoul. They obſerve, for example, that in fits of anger, the face reddens, the muſcles of the lips puff out, the eyes ſparkle; and that, on the contrary, in fits of melancholy, the eyes grow motionleſs and dead, the face pale, and the lips ſink in. It may be of ſervice to a painter to read theſe and ſuch other remarks; but it will be of infinitely more ſervice to ſtudy them in nature itſelf, from which they have been borrowed, and which exhibits them in that lively manner which neither tongue nor pen can expreſs.

But if a painter is to have immediate recourſe to nature in any thing, it is particularly in treating thoſe very minute and almoſt imperceptible differences, by which, however, things very different from each other are often expreſſed. This is particularly the caſe with regard to the paſſions of laughing and crying; as in theſe, however contrary, the muſcles of the face operate nearly in the ſame manner. As the famous Pietro de Cortona was one day finiſhing the face of a crying child in a repreſentation of the Iron Age, with which he was adoruing the floor, called the *Hot bath.* in the royal palace of Pitti, Ferdinand II. who happened to be looking over him for his amuſement, could not forbear expreſſing his approbation, by crying out, "Oh how well that child cries!" To whom the artiſt,—"Has your majeſty a mind to ſee how eaſy it is to make children laugh? Behold, I'll prove it in an inſtant:" And taking up his pencil, by giving the contour of the mouth a concave turn downwards, inſtead of the convex upwards which it before had, and with little or no alteration in any other part of the face, he made the child, who a little before ſeemed ready to burſt its heart with crying, appear in equal danger of burſting its ſides with immoderate laughter; and then, by reſtoring the altered features to their former poſition, he ſoon ſet the child a-crying again. [*Lectures of Philip Baldinucci*, in the academy of la Cruſca il Lyſtrato, &c.]

According to Leonardo da Vinci, the beſt maſters that a painter can have recourſe to in this branch, are thoſe dumb men, who have found out the method of expreſſing their ſentiments by the motion of their hands, eyes, eyebrows, and in ſhort every other part of the body. This advice, no doubt, is very good: but then ſuch geſtures muſt be imitated with great ſobriety and moderation; leſt they ſhould appear too ſtrong and exaggerated, and the piece ſhould ſhow nothing put pantomimes, when ſpeaking figures alone are to be exhibited; and ſo become theatrical and ſecond-hand, or, at beſt, look like the copy of a theatrical and ſecond-hand nature.

We are told ſtrange things of the ancient painters of Greece in regard to expreſſion: eſpecially of Ariſtides; who, in a picture of his, repreſenting a woman wounded to death at a ſiege, with a child crawling to her breaſt, makes her appear afraid, leſt the child, when ſhe was dead, ſhould, for want of milk, ſuck her blood. *A Medea murdering her children*, by Timomachus, was likewiſe much cried up, as the ingenious artiſt contrived to expreſs, at once, in her countenance, both the fury that hurried her on to the commiſſion of ſo great a crime, and the tenderneſs of a mother that ſeemed to withhold her from it. Rubens attempted to expreſs ſuch a double effect in the face of Mary of Medicis,

dicis, ſtill in pain from her paſt labour, and at the ſame time full of joy at the birth of a Dauphin. And in the countenance of Sancta Polonia, painted by Tiepolo for St Anthony's church at Padua, one may clearly read a mixture of pain from the wound given her by the executioner, and of pleaſure from the proſpect of paradiſe opened to her by it.

Few, to ſay the truth, are the examples of ſtrong expreſſion afforded by the Venetian, Flemiſh, or Lombard ſchools. Deprived of that great happineſs, the happineſs of being able to contemplate, at leiſure, the works of the ancients, the pureſt ſources of perfection in point of deſign, expreſſion, and character; and having nothing but nature conſtantly before their eyes; they made ſtrength of colouring, blooming complections, and the grand effects of the chiaroſcuro, their principal ſtudy: they aimed more at charming the ſenſes than at captivating the underſtanding. The Venetians, in particular, ſeem to have placed their whole glory in ſetting off their pieces with all that rich variety of perſonages and dreſs, which their capital is continually receiving by means of its extenſive commerce, and which attracts ſo much the eyes of all thoſe who viſit it. It is much to be doubted, if, in all the pictures of Paolo Veroneſe, there is to be found a bold and judicious expreſſion, or one of thoſe attitudes which, as Petrarch expreſſes it, ſpeak without words; unleſs, perhaps, it be that remarkable one in his *Marriage Feaſt of Cana of Galilee*. At one end of of the table, and directly oppoſite to the bridegroom, whoſe eyes are fixed upon her, there appears a woman in red, holding up to him the ſkirt of her garment; as much as to ſay, we may ſuppoſe, that the wine miraculouſly produced was exactly of the colour with the ſtuff on her back. And in fact it is red wine we ſee in the cups and pitchers. But all this while the faces and attitudes of moſt of the company betray not the leaſt ſign of wonder at ſo extraordinary a miracle. They all, in a manner, appear intent upon nothing but eating, drinking, and making merry. Such, in general, is the ſtyle of the Venetian ſchool. The Florentine, over which Michael Angelo preſided, above all things curious of deſign, was moſt minutely and ſcrupulouſly exact in point of anatomy. On this ſhe ſet her heart, and took ſingular pleaſure in diſplaying it. Not only elegance of form, and nobleneſs of invention, but likewiſe ſtrength of expreſſion, triumph in the Roman ſchool, nurſed as it were amongſt the works of the Greeks, and in the boſom of a city which had once been the ſeminary of learning and politeneſs. Here it was that Domenichino and Pouſſin, both great maſters of expreſſion, refined themſelves, as appears more particularly by the St *Jerome* of the one, and the *Death of Germanicus*, or the *Slaughter of the Innocents*, by the other. Here it was that aroſe Raphael, the ſovereign maſter of them all. One would imagine, that pictures, which are generally conſidered as the books of the ignorant, and of the ignorant only, he had undertaken to make the inſtructors even of the learned. One would imagine, that he intended, in ſome meaſure, to juſtify Quintilian *, who affirms, that painting has more power over us than all the arts of rhetoric. There is not, indeed, a ſingle picture of Raphael's, from the ſtudy of which thoſe who are curious in point of expreſſion may not reap great benefit; particularly his *Martyrdom of St Felicitas*, his *Transfigurations*, his *Joſeph explaining to Pharaoh his dream*, a piece ſo highly rated by Pouſſin. His *School of Athens*, in the Vatican, is, to all intents and purpoſes, a ſchool of expreſſion. Among the many miracles of art with which this piece abounds, we ſhall ſingle out that of the four boys attending on a mathematician, who, ſtooping to the ground, his compaſſes in his hand, is giving them the demonſtration of a theorem. One of the boys, recollecting within himſelf, keeps back, with all the appearance of profound attention to the reaſoning of the maſter; another, by the briſkneſs of his attitude, diſcovers a greater quickneſs of apprehenſion; while the third, who has already ſeized the concluſion, is endeavouring to beat it into the fourth, who, ſtanding motionleſs, with open arms, a ſtaring countenance, and an unſpeakable air of ſtupidity in his looks, will never perhaps be able to make any thing of the matter. And it is probably from this very groupe that Albani, who ſtudied Raphael ſo cloſely, drew the following precept of his: "That it behoves a painter to expreſs more circumſtances than one by every attitude; and ſo to employ his figures, that, by barely ſeeing what they are actually about, one may be able to gueſs, both what they have been already doing, and are next going to do." This is indeed a difficult precept; but it is only by a due obſervance of it that the eye and the mind can be made to hang in ſuſpence on a painted piece of canvas. It is expreſſion that a painter, ambitious to ſoar in his profeſſion, muſt, above all things, labour to perfect himſelf in. It is the laſt goal of his art, as Socrates proves to Parrhaſius. It is in expreſſion that dumb poetry conſiſts, and what the prince of our poets calls a viſible language.

Xenoph. Memorab. l. iii.

SECT. XI. *Of proper Books for a Painter.*

FROM what has been already ſaid, it may be eaſily gathered, that a painter ſhould be neither illiterate, nor unprovided with books. Many are apt to imagine, that the Iconologia of Ripa, or ſome ſuch collection, is alone ſufficient for this purpoſe; and that all the apparatus he ſtands in need of, may be reduced to a few caſts of the remains of antiquity, or rather to what rembrants uſed to call his *antiques*, being nothing more than coats of mail, turbants, ſherds of ſtuff, and all manner of old houſehold trumpery and wearing apparel. Such things, no doubt, are neceſſary to a painter, and, perhaps, enough for one who wants only to paint half-lengths, or is willing to confine himſelf to a few low ſubjects. But they are by no means ſufficient for him who would ſoar higher; for a painter who would attempt the Univerſe, and repreſent it in all its parts, ſuch as it would appear, had not matter proved refractory to the intentions of the ſovereign Artiſt. Such a painter alone is a true, an univerſal, a perfect painter.——No mortal, indeed, muſt ever expect to riſe to that ſublimity; yet all ſhould aſpire to it, on pain of ever continuing at a very mortifying diſtance from it: as the orator, who wiſhes to make a figure in his profeſſion, ſhould propoſe to himſelf no leſs a pattern than that perfect orator deſcribed by Tully; nor the courtier, than that perfect courtier delineated by Caſtiglione. It cannot, therefore, appear ſurpriſing if we inſiſt on the propriety of reckoning a good col-

Algarotti on Painting.

---

* *Inſtit. lib. xi. cap. 3.*

Books for a Painter.

lection of books as part of ſuch a painter's implements. The Bible, the Greek and Roman hiſtorians, the works of Homer, that prince of painters, and of Virgil, are the moſt claſſical. To theſe let him add the Metamorphoſes of Ovid, ſome of our beſt poets, the voyage of Pauſanias, Vinci, Vaſari, and others upon painting.

It will alſo be of conſiderable advantage to him to have a well-choſen collection of drawings by the beſt maſters, in order to trace the progreſs and hiſtory of his art, and make himſelf acquainted with the various ſtyles of painting, which have been, and now are, in the greateſt vogue. The prince of the Roman ſchool was not aſhamed to hang up in his ſtudy the drawings of Albert Durer; and ſpared no pains or expence to acquire all the drawings he could meet with, that were taken from baſſo relievos; things, which the art of engraving has ſince rendered ſo common as to be in every one's hands. This art of multiplying drawings by means of the graver is of the ſame date, and boaſts the ſame advantages, with the art of printing, by means of which the works of the mind are multiplied, as it were, at one ſtroke, and diſperſed over the whole world.

The ſight of fine ſubjects treated by able maſters, and the different forms which the ſame ſubjects aſſume in different hands, cannot fail both of enlightening and enflaming the mind of the young painter. The ſame may be ſaid of the peruſal of good poets and hiſtorians, with the particulars and proofs of what they advance; not to mention thoſe ideas and flights of invention, with which the former are wont to clothe, beautify, and exalt every thing they take in hand. Bouchardon, after reading Homer, conceited, to uſe his own words, that men were three times taller than before, and that the world was enlarged in every reſpect. It is very probable, that the beautiful thought of covering Agamemnon's face with the ſkirt of his mantle, at the ſacrifice of Iphigenia, was ſuggeſted to Timantes by the tragedy of Euripides. And the ſublime conceit of Raphael, who, in a *Creation* of his, repreſents God in the immenſe ſpace, with one hand reaching to the ſun and the other to the moon, may be conſidered as the child of the following words of the Pſalmiſt: *The heavens declare the glory of God, and the firmament ſheweth his handy-work.*

This thought of Raphael has been, indeed, cenſured by Mr Webb. "A God," ſays this gentleman, "extending one hand to the ſun, and another to the moon, deſtroys that idea of immenſity, which ſhould accompany the work of creation, by reducing it to a world of a few inches." But the opinion of Count Algarotti is very different. "For my part," ſays that elegant critic, "I cannot diſcover, in this painting, a world of a few inches, but a world on a much greater ſcale; a world of millions and millions of miles: and yet this ſo immenſe a world, by means of that act of the Godhead, in which with one hand he reaches to the ſun, and with the other to the moon, ſhrinks, in my imagination, to a mere nothing, in reſpect to the immenſity of God himſelf; which is all that the powers of painting can pretend to. This invention is, though in a contrary ſenſe, of the ſame kind with that of Timantes, who, to expreſs the enormous ſize of a ſleeping Polyphemus, placed round him ſome ſatires meaſuring the monſter's thumb with a thyrſus. Hence Pliny, who relates the fact, takes occaſion to tell us, that his works always imply more than they expreſs; and that how great ſoever he may be in execution, he is ſtill greater in invention: *Atque in omnibus ejus operibus intelligitur plus ſemper quam pingitur; et cum ars ſumma ſit, ingenium tamen ultra artem eſt.*" Nat. Hiſt. lib. xxxv. c. x.

Books for a Painter.

The peruſal of good authors cannot but be very ſerviceable to a painter in another reſpect; as, among the great number of ſubjects afforded by hiſtory and poetry, he may expect to meet with many on which his talents may diſplay themſelves to the greateſt advantage. A painter can never be too nice in the choice of his arguments; for on the beauty of them, that of his piece will greatly depend. How much to be pitied, therefore, were our firſt maſters, in being ſo often obliged to receive their ſubjects from the hands of ſimple and illiterate perſons! and what is worſe, to ſpend all the riches of their art upon barren or unworthy ſubjects! Such are the repreſentations of thoſe ſaints, who, though they never had the leaſt intercourſe with each other, and perhaps even lived in different ages, are, notwithſtanding, to be introduced, *tete a tete*, as it were, in the ſame picture. The mechanic of the art, may, indeed, diſplay itſelf on theſe occaſions; but by no means the ideal. The diſpoſition may be good and praiſe-worthy, as in the works of Cortona and Lanfranc; but we are not to expect in them either invention or expreſſion, which require for their baſis the repreſentation of ſome fact capable of producing ſuch effects. Who does not, on the bare mention of this abuſe, immediately recollect many ſad inſtances of it? ſuch as the famous St Cæcilia of Raphael, ſurrounded by St Paul, St Mary Magdalen, St John, and St Auguſtin; and the picture of Paolo Veroneſe, in the veſtry of the Nuns of St Zachary at Venice, in which St Frances of Aſſizium, Saint Catharine, and St Jerome richly habited in his cardinal's robes, form a ring round the Virgin ſeated on a throne with the child Jeſus in her arms; perhaps the moſt beautiful and pictureſque of all the inſipid and inſignificant pieces with which Italy abounds. It is very ſhocking to think, that young painters ſhould be obliged to ſtudy their art from ſuch wretched compoſitions.

The ſubjects in which the pencil triumphs moſt, and with which a judicious painter may ſtock himſelf by the peruſal of good books, are, no doubt, thoſe which are moſt univerſally known, which afford the largeſt field for a diſplay of the paſſions, and contain the greateſt variety of incidents, all concurring, in the ſame point of time, to form one principal action. Of this the ſtory of Coriolanus beſieging Rome, as related by Livy, is a ſhining example. Nothing can be imagined more beautiful than the ſcene of action itſelf, which ought to take in the pretorium in the camp of the Volſcians, the Tiber behind it, and the ſeven hills, among which the towering Capitol is, as it were, to lord it over the reſt. It is impoſſible to conceive a greater variety, than what muſt appear in that crowd of ſoldiers, women, and children, all which are to enter the compoſition; unleſs, perhaps, it be that of the different paſſions with which they are ſeverally agitated; ſome wiſhing that Coriolanus may raiſe the ſiege, others fearing it, others again ſuſpecting it. But the principal groupe forms the pictureſque part of the piece. Coriolanus, haſtily deſcending from his tribunal, and hurried on by love, to embrace his mother, ſtops ſhort through ſhame, on her crying out to him, Hold! let me firſt know, if it is a ſon, or an enemy, I am going to embrace? Thus a painter may impart novelty to the moſt hackneyed ſubject by taking, for his guides thoſe authors who poſſeſs the happy talent of adding grace and dignity, by their beautiful and ſublime deſcriptions, even to the moſt common and trifling tranſactions.

Liv. Dec. I. lib. 2.

Sect. XV. *Of the Painter's Balance.*

18. The celebrated de Piles, who by his writings, has thrown ſo much light upon painting, in order to aſſiſt young painters in forming a right judgment of thoſe maſters who hold the firſt rank in the profeſſion, and to reduce ſuch judgment to the greater preciſion, bethought himſelf of a pictorical balance, by means of which a painter's merit may be weighed with the greateſt exactneſs. This merit he divides into Compoſition, Deſign, Colouring, and Expreſſion; and in each of theſe branches he has aſſigned every painter that ſhare he thought him entitled to, according as he approached more or leſs the higheſt degree of excellence and ſummit of perfection; ſo that, by ſumming up the numbers which, ſtanding againſt each maſter's name, expreſs his ſhare of merit in each of theſe branches, we have his total merit or value in the art, and may hence gather what rank one painter holds in regard to another. Several objections, it is true, have been ſtarted to this method of calculation, by a famous mathematician of our days, who, among other things, inſiſts, that it is the product of the above numbers multiplied by each other, and not the ſum of them, that gives the merit of the artiſt. But this is not a place to enter into ſuch niceties, nor indeed would the doing it be of any ſervice to the art. The only thing worth our notice is, whether the original numbers, ſtanding for the painter's merit in the ſeveral branches of his art, are ſuch as he is really intitled to, without ſuffering ourſelves to be biaſſed by any partiality, as de Piles has been, in favour of the prince of the Flemiſh ſchool; the conſequence of which, ſtrange as it may appear, is, that in his balance Raphael and Rubens turn out exactly of the ſame weight.

See Mairan's remarks, in *Mem. de l'Acad. des Sciences*, 1753.

Raphael is now univerſally allowed to have attained that degree of perfection, beyond which it is ſcarce lawful for mortals to aſpire. Painting, in ſome meaſure, revived among us by the diligence of Cimabue, towards the decline of the 13th century, received no ſmall improvements from the genius of Giotto, Maſaccio, and others; inſomuch that, in leſs than 200 years, it began to blaze forth with great luſtre in the works of Ghirlandai, Gian Bellino, Mantegna, Pietro Perugino, and Leonardo da Vinci, the beſt grounded of them all, a man of great learning, and the firſt who contrived to give relief to pictures. But whatever improvement the art might have received from theſe different maſters in different parts of Italy, they ſtill, to a man almoſt, ſervilely followed the ſame manner, and all partook more or leſs of that hardneſs and dryneſs, which, in an age ſtill Gothic, painting received from the hands of its reſtorer Cimabue; till Raphael, at length, iſſuing from the Peruginian ſchool, and, ſtudying the works of the Greeks, without ever loſing ſight of nature, brought the art, in a manner, to the higheſt pitch of perfection. This great man has, if not entirely, at leaſt in a great meaſure, attained thoſe ends which a painter ſhould always propoſe to himſelf, to deceive the eye, ſatisfy the underſtanding, and touch the heart. So excellent are his pieces, that the ſpectator, far from praiſing his pencil, ſeems ſometimes entirely to forget that they are the feats of it which he has before him; ſolely intent upon, and as it were tranſported to, the ſcene of action, in which he almoſt fancies himſelf a party. Well, indeed, has he deſerved the title of *divine*, by the beauty and comprehenſiveneſs of his expreſſion, the juſtneſs and nobleneſs of his compoſitions, the chaſtity of his deſigns, and the elegance of his forms, which always carry a natural ingenuity along with them; but above all, by that inexpreſſible gracefulneſs, more beautiful than beauty itſelf, with which he has contrived to ſeaſon all his pieces. Carlo Marrati having engraved a piece, called the *School*, placed at the top of it the three Graces, with this verſe under them,

Seneza di noi ogni fatica é vana;
"Without our aid, all labour is in vain."

Algarotti.

Without their aid, in fact, the light of a picture is no better than darkneſs, every attitude is inſipid, every motion auwkward. It is they who impart to every thing that *Je ne ſçai quoi*, that charm, which is as ſure to conquer, as impoſſible to be defined. Maratti has placed the Graces on high, and, as it were, deſcending from heaven, in order to ſhew that they really are a celeſtial gift. Happy the artiſt on whoſe cradle they have ſmiled, whoſe vows and offerings they have not diſdained! Maratti was not to be informed, that gracefulneſs, that jewel which adds ſuch value to every thing, tho' not originally obtainable by all the gold of diligence and ſtudy, may yet be greatly heightened and poliſhed by them.

Though Raphael might boaſt, like Apelles [*] of old, whom he reſembled in ſo many other reſpects, that in gracefulneſs he had no equal; yet Parmigiano and Correggio muſt be allowed to have come very near him. One of them has, however, often treſpaſſed the juſt bounds of ſymmetry; and the other is not always chaſte in his deſigns: both, beſides, were too apt to be guilty of affectation. We ought perhaps to forgive Corregio every thing, for the ſake of that uncommon greatneſs of manner, that life and ſoul, which he has infuſed into all his figures; for the ſake of that inimitable eaſe and delicacy of pencil, which makes his pieces appear as if finiſhed in a day, and ſeen in a glaſs. Of this we have a ſufficient proof in the Ancona of St Jerome and the Magdalen on their knees before the child Jeſus, which is in Parma; the fineſt picture, perhaps, that ever iſſued from mortal hands.

Algarotti.

There are ſome glimpſes of Corregio's ſtyle in the works of Barocci, though he ſtudied at Rome. He never drew a figure that he did not borrow from nature; and, for fear of loſing the maſſes, uſed to drape his models with very large folds. His pencil was exceedingly ſweet, and his colouring equally harmonious. He indeed ſpoiled a little the natural tints by too free an uſe of reds and blues; and has now and then robbed things of their body, by ſhading them too much, and melting them, as it were, into one ano-

---

[*] *Quintil. Inſtit.* l. xii. c. 10.

Painter's Balance.

ther. In point of deſign, he was far more diligent than ſucceſsful; and, in the air of his heads, affected the gracefulneſs of the Lombard ſchool, rather than the elegance of the Greeks and his countryman Raphael.

Julio Romano, full of ſpirit, and of learning and uncommon conceits, ſeems to come nearer the manner of Michael Angelo than the elegantly natural one of Raphael, under whom he ſtudied.

The Germans, by ſervilely following Michael Angelo, gave into thoſe ſtrange attitudes and clumſy forms which appear in the works of their greateſt men, Sprangher and Golzio.

The Florentines copied him with greater judgment and diſcretion. We muſt, however, except Andrea del Sarto, who, though an obſerver of truth, is ſomewhat clumſy in his figures. But then he is eaſy in his draperies; ſweet in his colours; and would have carried the palm among the Tuſcans, had it not been raviſhed from him by Fra. Bartolomeo; to immortaliſe whom, his *St Mark* in the palace of Pitti would alone be ſufficient; for there is not wanting in that piece any of the perfections neceſſary to conſtitute an excellent maſter.

Titian, whom Giorgione firſt imitated in the art, is an univerſal maſter. Upon every thing he took in hand, he has contrived to ſtamp its own proper nature. His pencil flows with juices that are truly vital. His figures breathe; and the blood circulates in their faces. And though ſome perhaps have ſurpaſſed him in deſign; not but that he is generally correct enough in the bodies of his women; and his children, on account of their form, have been ſtudied by the greateſt maſters †; he never had his equal in colouring, or in portrait and landſcape painting. He moſt indefatigably ſtudied truth, and never loſt ſight of her. He moſt indefatigably laboured to convert, if we may be allowed the expreſſion, the colours of his pallet into fleſh and blood. But what coſt him moſt was, as he himſelf confeſſes, to cover and hide his fatigue: and in this he has ſucceeded ſo well, that his works ſeem rather born than made. His fortune equalled his merit. He was greatly honoured by Charles V. as the great Raphael had been, a few years before, by the Popes Julius II. and Leo X.

† *Bellori's Lives of Pouſſin* and *Fr. Fiamingo.*

Jacopo Baſſano diſtinguiſhed himſelf, at the ſame time, by the ſtrength of his colouring. Few have equalled him in the juſt diſpenſation of light reflected from one object to another, and in thoſe happy contraſts by means of which painted objects become really tranſparent. He may boaſt his having deceived an Annibal Caracci, as Pharrhaſio formerly deceived Zeuxes; and had the glory of Paolo Veroneſe's not being willing that his ſon Carletto ſhould learn the principles of colouring from any other maſter.

Paolo Veroneſe was the creator, as it were, of a new manner. Though careleſs in point of deſign, and in point of coſtume extremely licentious, he was noble of fancy, and moſt fruitful of invention. One would imagine, that thoſe who behold his magnificent pictures longed to be of the action repreſented by them; and it may be ſaid of him with great juſtice, that even his faults are pleaſing. He has had very great admirers in every age; and among them a Guido Reni, whoſe praiſe, no doubt, would have flattered him moſt.

Tintoret is no way inferior to any of the Venetians in thoſe pieces which he drew by way of diſplaying his talents, and not improving them. This he has particularly ſhown in his *Martyrdom*, now in the ſchool of St Mark; in which there is deſign, colouring, compoſition, effects of light, life, expreſſion, and all carried to the higheſt pitch of perfection. Scarce had this picture made its appearance, when all mankind ſeemed to fall in love with it. Aretine himſelf, tho' ſo warm a friend to Titian, that, through mere jealouſy he turned Tintoret out of his ſchool, could not forbear crying it up to exceſs. He wrote himſelf to Tintoret, that this piece had extorted the applauſe of all thoſe who ſaw it. The ſcene, adds he, appears rather true than feigned; and happy would you be, if, inſtead of being ſo expeditious, you could prevail on yourſelf to be a little more patient.

Raccolta di Lettere ſulla Pittura, Scultura, e Architettura, Tom. iii. let. 65.

Next to theſe great artiſts, who had no guide but nature, or the moſt perfect copies of nature, the Greek ſtatues, ſtarted up thoſe other artiſts, whom we are not to conſider as the diſciples of nature, ſo much as of thoſe maſters who a little before had revived the art of painting, and reſtored it to its ancient honour and dignity. Such were the Caraccis, who undertook to unite in their manner the beauties of all the moſt famous Italian ſchools, and founded a new one, which did not yield to the Roman in elegance of forms, to the Florentine in correctneſs of deſign, nor to the Venetian or Lombard in beauty of colouring. Theſe ſchools, if we may be allowed the expreſſion, are the primitive metals of painting; and the Caraccis, by melting them down together, compoſed a Corinthian metal, noble indeed and beautiful to look at, but wanting the ſtrength, ductility, and weight, poſſeſſed ſingly by the different metals which compoſe it. And indeed the greateſt praiſe that can be beſtowed on the works of the Caraccis, is not owing to any air of originality in them, or any perfect imitation of nature, but to the ſtriking likeneſs in them to the manner of Titian, Raphael, Parmigianino and Correggio. As to the reſt, the Caraccis did not neglect to provide their ſchool with all thoſe helps which learning could afford; from a conviction that the arts never ſucceed through mere good fortune or boldneſs of fancy, but are rather ſo many habits working according to the dictates of learning and right reaſon. In their ſchool, the pupils were taught perſpective, anatomy, in a word every thing neceſſary to lead them by the ſhorteſt and ſafeſt road. And it is to this that we are chiefly to attribute the ſchool of Bologna's having produced a greater number of able maſters than any other.

At the head of theſe maſters ſtand Domenichino and Guido; one a moſt curious obſerver of nature, and moſt profound painter; the other the inventor of a certain noble and beautiful manner peculiar to himſelf, which ſhines eſpecially in that ſweetneſs and beauty he has contrived to give the faces of his women. Both theſe artiſts have been preferred to the Caraccis; and it muſt be owned, that the laſt did really excel them.

Franceſco Barbieri, called *il Guercino*, ſtudied firſt in this ſchool; but he afterwards formed to himſelf a certain peculiar manner, entirely founded upon nature and truth. Quite careleſs in the choice of his forms, he produced a chiaroſcuro that gives the greateſt relief to objects, and renders them palpable. Caravaggio,

the

Painter's Balance.

the Rembrants of Italy, was the real author of this manner; which, in theſe our days, has been again brought to light by Piazetta and Creſpi. He abuſed the ſaying of that Greek, who being aſked, who was his maſter, pointed to the populace; and ſuch, indeed, was the magic of his chiaroſcuro, that, as often as he undertook to copy nature in low and trivial ſubjects, he had the power of deceiving even a Domenichino and a Guido. The ſtyle of Caravaggio was followed by two famous Spaniards; Valeſquez, the founder of a ſchool among his countrymen; and il Ribera, who ſettled in Italy, and from whom afterwards the whimſical Salvator Roſa, and that moſt fertile genius Lucas Giordano, the Proteus and thunderbolt of painting, ſtudied the firſt principles of the art.

Between the maſters of the Bolognian and thoſe of the other ſchools of Italy, we are to place Rubens, the prince of the Flemiſh ſchool, and a man of the moſt elevated genius, who appeared, at once, as painter and ambaſſador in a country, which, in a few years after, ſaw one of its greateſt poets ſecretary of ſtate. Nature endowed him with great vivacity, and great eaſe is working; and he added learning to theſe natural gifts. He, too, ſtudied our maſters, Titian, Tintoret, Caravaggio and Paulo; and borrowed a little from every one of them, ſo ſparingly, however, that his own peculiar manner predominates. He was in his movements more moderate than Tintoret, more ſoft in his chiaroſcuro than Caravaggio; but not ſo rich in his compoſitions, or light in his touches, as Paolo; and, in his carnations, always leſs true than Titian, and leſs delicate than his own ſcholar Vandycke. He contrived to give his colours the greateſt tranſparency, and no leſs harmony, notwithſtanding the extraordinary deepneſs of them; and he had a ſtrength and grandeur of ſtyle entirely his own. He would have ſoared ſtill higher, had nature afforded him finer objects in Flanders, or had he known how to create them anew, or correct them after the patterns left us by the Greek maſters.

Pouſſin, the prince of French painters, had a particular fondneſs for the works of Rubens, at the ſame time that he ſought for the art of deſign among the ancient marbles, in which, as an ingenious author expreſſes it, ſhe ſits as Queen to give law to the moderns. He ſpared no pains in the choice and compoſition of his ſubjects; and gave them life, learning, and dignity. He would have equalled Raphael himſelf, whoſe ſtyle he imitated; were gracefulneſs, eaſe, and vivacity, to be acquired by ſtudy. For, in fact, it was by mere dint of labour and fatigue, that he produced what in a manner coſt Raphael nothing; inſomuch, that his figures may be ſaid to mimic the natural actions of that great maſter.

Imitation.

SECT. XVI. *Of Imitation.*

19. A painter ought attentively to conſider, compare together, and weigh in the balance of reaſon and truth, all theſe different ſtyles. But he ought likewiſe carefully to guard againſt too great a fondneſs for any one of them in particular that he may think proper to adopt; otherwiſe, to uſe the Danteſque expreſſion of a firſt-rate maſter †, inſtead of the child, he would become the grand-child, of nature.

Beſides, his imitation muſt be of generals and not of particulars. Whatever a young painter's natural diſpoſition may be, whether to paint boldly and freely like Tintoret and Rubens, or to labour his works like Titian or da Vinci, let him follow it. This kind of imitation is very commendable. It is thus that Dante, at the ſame time that he carefully avoided adopting the particular expreſſions of Virgil, endeavoured to ſeize his bold and free manner, and at laſt caught from him that elegance of ſtyle which has done him ſo much honour.

20. As to the reſt, nothing ſhould hinder an able maſter from making uſe now and then of any antique, or even modern figure, which he may find his account in employing. Sanzio, in a *St Paul at Liſtra*, ſcrupled not to avail himſelf of an ancient ſacrifice in baſſo-relievo; nor did Buonarroti himſelf diſdain to uſe, in his paintings of the Sextine chapel, a figure taken from that famous cornelian which tradition tells us he wore on his fingers, and which is now in the poſſeſſion of the moſt Chriſtian King. Men like theſe avail themſelves of the productions of others in ſuch a manner as to make us apply to them, what La Bruyere ſaid of Deſpreaux, that one would imagine the thoughts of other men had been of his own creation.

In general, a painter ſhould have his eye conſtantly fixed on nature, that inexhauſtible and varied ſource of every kind of beauty; and ſhould ſtudy to imitate her in her moſt ſingular effects. As beauty ſcattered over the whole univerſe, ſhines brighter in ſome objects than in others, he ſhould never be without his little book and crayon, in order to make drawings of every beautiful or uncommon object that may happen to preſent itſelf; and take ſketches of every fine building, every ſituation, every effect of light, every flight of clouds, every flow of drapery, every attitude, every expreſſion of the paſſions, that may happen to ſtrike him. He may afterwards employ theſe things as occaſions offer; and in the mean time will have the advantage of acquiring a grand taſte. By uniting in a grand compoſition effects no leſs bold and beautiful than true and natural, he will acquire the ſame glory that orators acquire by the ſublime, the glory of ſurpriſing, and in a manner exalting us above ourſelves.

PART II. Of the Different CLASSES of PAINTING.

SECT. I. *General Enumeration.*

21. As all the objects in nature are ſuſceptible of imitation by the pencil, the maſters of this art have applied themſelves to different ſubjects, each one as his talents, his taſte, or inclination, may have led him. From whence have ariſen the following claſſes.

I. *Hiſtory-painting:* which repreſents the principal events in hiſtory ſacred and profane, real or fabulous; and to this claſs belongs *allegorical expreſſion*. Theſe are the moſt ſublime productions of the art; and in which Raphael, Guido, Rubens, Le Brun, &c. have excelled.

---

† *Da Vinci on Painting.*

Different Claſſes of Painting.

II. *Rural hiſtory;* or the repreſentation of a country life, of villages and hamlets, and their inhabitants. This is an inferior claſs; and in which Teniers, Breughel, Watteau, &c. have great reputation, by rendering it at once pleaſing and graceful.

III. *Portrait-painting;* which is an admirable branch of this art, and has engaged the attention of the greateſt maſters in all ages, as Apelles, Guido, Van Dyke, Rembrandt, Regauds, Peſne, Kneller, La Tour, &c.

IV. *Groteſque hiſtories:* as the nocturnal meetings of witches; ſorceries, and incantations; the operations of mountebanks, &c. A ſort of painting in which the younger Breughel, Teniers, and others, have exerciſed their talents with ſucceſs.

V. *Battle-pieces;* by which Huchtemberg, Wouwerman, &c. have rendered themſelves famous.

VI. *Landſcapes;* a charming ſpecies of painting, that has been treated by maſters of the greateſt genius in every nation.

VII. *Landſcapes diverſified with waters,* as rivers, lakes, cataracts, &c.; which require a peculiar talent, to expreſs the water ſometimes ſmooth and tranſparent, and at others foaming and ruſhing furiouſly along.

VIII. *Sea-pieces;* in which are repreſented the ocean, harbours, and great rivers; and the veſſels, boats, barges, &c. with which they are covered; ſometimes in a calm, ſometimes with a freſh breeze, and at others in a ſtorm. In this claſs Backhuyſen, Vandervelde, Blome, and many others, have acquired great reputation.

IX. *Night-pieces;* which repreſent all ſorts of objects, either as illuminated by torches, by the flames of a conflagration, or by the light of the moon. Schalck, Vanderneer, Vanderpool, &c. have here excelled.

X. *Living Animals:* A more difficult branch of painting than is commonly imagined; and in which Roſa, Carré, Vandervelde, and many others, have ſucceeded marvellouſly well.

XI. *Birds of all kinds;* a very laborious ſpecies, and which requires extreme patience minutely to expreſs the infinite variety and delicacy of their plumage.

XII. *Culinary pieces;* which repreſent all ſorts of proviſions, and animals without life, &c. A ſpecies much inferior to the reſt, in which nature never appears to advantage, and which requires only a ſervile imitation of objects that are but little pleaſing. The painting of fiſhes is naturally referred to this claſs.

XIII. *Fruit-pieces,* of every kind, imitated from nature.

XIV. *Flower-pieces;* a charming claſs of painting, where Art in the hands of Huyzum, P. Segerts, Merian, &c. becomes the rival of Nature. *Plants* and *inſects* are uſually referred to the painters of flowers, who with them ornament their works.

XV. *Pieces of architecture;* a kind of painting in which the Italians excel all others. Under this claſs may be comprehended the repreſentations of ruins, ſeaports, ſtreets, and public places; ſuch as are ſeen in the works of Caneletti, and other able maſters.

XVI. *Inſtruments of muſic, pieces of furniture,* and other inanimate objects; a trifling ſpecies, and in which able painters only accidentally employ their talents.

XVII. *Imitations of bas-reliefs;* a very pleaſing kind of painting, and which may be carried by an able hand to a high degree of excellence.

XVIII. *Hunting pieces:* theſe alſo require a peculiar talent, as they unite the painting of men, horſes, dogs, and game, to that of landſcapes.

Of Landſcape Painting.

It will not be expected that we ſhould here give the rules that the painter is to obſerve in handling each particular ſubject. What has been ſaid on hiſtorical painting (Part I. *) may throw ſome light on the reſt, and the particular rules muſt be learned from the ſtudy of the art itſelf. Good maſters, academies of reputation, and a rational practice, are the ſources from whence the young painter muſt derive the detail of his art. We ſhall however inſert ſome rules and obſervations relative to *Landſcape* and *Portrait;* theſe, with *Hiſtory-painting* (already pretty fully treated), forming the principal branches of the art.

* In the ſections of Invention and Diſpoſition.

SECT. II. *Of Landſcape.*

22. LANDSCAPE-painting includes every object that the country preſents: And is diſtinguiſhed into the *heroic,* and the *paſtoral* or *rural;* of which indeed all other ſtyles are but mixtures.

De Piles on Painting.

The *heroic ſtyle* is a compoſition of objects, which in their kinds draw both from art and nature every thing that is great and extraordinary in either. The ſituations are perfectly agreeable and ſurpriſing. The only buildings are temples, pyramids, ancient places of burial, altars conſecrated to the divinities, pleaſure-houſes of regular architecture; and if nature appear not there as we every day caſually ſee her, ſhe is at leaſt repreſented as we think ſhe ought to be. This ſtyle is an agreeable illuſion, and a ſort of enchantment, when handled by a man of fine genius and a good underſtanding, as Pouſſin was, who has ſo happily expreſſed it. But if, in the courſe of this ſtyle, the painter has not talent enough to maintain the ſublime, he is often in danger of falling into the childiſh manner.

The *rural ſtyle* is a repreſentation of countries, rather abandoned to the caprice of nature, than cultivated: we there ſee nature ſimple, without ornament, and without artifice; but with all thoſe graces wherewith ſhe adorns herſelf much more when left to herſelf than when conſtrained by art.

In this ſtyle, ſituations bear all ſorts of varieties: ſometimes they are very extenſive and open, to contain the flocks of the ſhepherds; at others very wild, for the retreat of ſolitary perſons, and a cover for wild beaſts.

It rarely happens that a painter has a genius extenſive enough to embrace all the parts of painting: there is commonly ſome one part that pre-engages our choice, and ſo fills our mind, that we forget the pains that are due to the other parts; and we ſeldom fail to ſee, that thoſe whoſe inclination leads them to the heroic ſtyle, think they have done all, when they have introduced into their compoſitions ſuch noble objects as will raiſe the imagination, without ever giving themſelves the trouble to ſtudy the effects of good colouring. Thoſe, on the other hand, who practiſe the paſtoral, apply cloſely to colouring, in order to repreſent truth more lively. Both theſe ſtyles have their ſectaries and partiſans. Thoſe who follow the heroic, ſupply by their imagination what it wants of truth, and they look no farther.

As a counterbalance to heroic landſcape, it would be proper to put into the paſtoral, beſides a great character of truth, ſome affecting, extraordinary, but probable effect of nature, as was Titian's cuſtom.

There is an infinity of pieces wherein both theſe ſtyles happily meet; and which of the two has the aſcendant, will appear from what we have been juſt obſerving of their reſpective properties. The chief parts of landſcape are, their openings or ſituations, accidents, ſkies and clouds, off-ſkips and mountains, verdure or turfing, rocks, grounds or lands, terraces, fabrics, waters, fore-grounds, plants, figures and trees; of all which in their places.

23. *Of Openings or Situations.* The word *ſite*, or ſituation, ſignifies the "view, proſpect, or opening of a country." It is derived from the Italian word *ſito;* and our painters have brought it into uſe, either becauſe they were uſed to it in Italy, or becauſe, as we think, they found it to be very expreſſive.

Situations ought to be well put together; and ſo diſengaged in their make, that the conjunction of grounds may not ſeem to be obſtructed though we ſhould ſee but a part of them.

Situations are various, and repreſented according to the country the painter is thinking of: as either open or cloſe, mountainous or watery, tilled and inhabited, or wild and lonely; or, in fine, variegated by a prudent mixture of ſome of theſe. But if the painter be obliged to imitate nature in a flat and regular country, he muſt make it agreeable by a good diſpoſition of the *claro-obſcuro*, and ſuch pleaſing colouring as may make one ſoil unite with another.

It is certain, that extraordinary ſituations are very pleaſing, and cheer the imagination by the novelty and beauty of their makes, even when the local colouring is but moderately performed: becauſe, at worſt, ſuch pictures are only looked on as unfiniſhed, and wanting to be completed by ſome ſkilful hand in colouring; whereas common ſituations and objects require good colouring and abſolute finiſhing, in order to pleaſe. It was only by theſe properties that Claud Lorrain has made amends for his inſipid choice in moſt of his ſituations. But in whatever manner that part be executed, one of the beſt ways to make it valuable, and even to multiply and vary it without altering its form, is properly to imagine ſome ingenious accident in it.

24. *Of Accidents.* An accident in painting is an obſtruction of the ſun's light by the interpoſition of clouds, in ſuch manner, that ſome parts of the earth ſhall be in light and others in ſhade, which, according to the notion of the clouds, ſucceed each other, and produce ſuch wonderful effects and changes of the *claro-obſcuro*, as ſeem to create ſo many new ſituations. This is daily obſerved in nature. And as this newneſs of ſituations is grounded only on the ſhapes of the clouds, and their motions, which are very inconſtant and unequal, it follows, that theſe accidents are arbitrary; and a painter of genius may diſpoſe them to his own advantage when he thinks fit to uſe them: For he is not abſolutely obliged to do it; and there have been ſome able landſcape-painters who have never practiſed it, eithrough fear or cuſtom, as Claude Lorrain and ſome others.

25. *Of the Sky and Clouds.* The ſky, in painters terms, is the ethereal part over our heads; but more particularly the air in which we breathe, and that where clouds and ſtorms are engendered. Its colour is blue, growing clearer as it approaches the earth, becauſe of the interpoſition of vapours ariſing between the eye and the horizon; which, being penetrated by the light, communicates it to objects in a greater or leſſer degree, as they are more or leſs remote.

But we muſt obſerve, that this light being either yellow or reddiſh in the evening, at ſun-ſet, theſe ſame objects partake not only of the light, but of the colour: thus the yellow light mixing with the blue, which is the natural colour of the ſky, alters it, and gives it a tint more or leſs greeniſh, as the yellowneſs of the light is more or leſs deep.

This obſeevation is general and infallible: but there is an infinity of particular ones, which the painter muſt make upon the natural, with his pencil in his hand, when occaſion offers; for there are very fine and ſingular effects appearing in the ſky, which it is difficult to make one conceive by phyſical reaſons. Who can tell, for example, why we ſee, in the bright part of ſome clouds, a fine red, when the ſource of the light which plays upon them is a moſt lively and diſtinguiſhing yellow? Who can account for the different reds ſeen in different clouds, at the very moment that theſe reds receive the light but in one place? for theſe colours and ſurpriſing appearances ſeem to have no relation to the rainbow, a phænomenon for which the philoſophers pretend to give ſolid reaſons.

Theſe effects are all ſeen in the evening, when the weather is inclining to change, either before a ſtorm, or after it, when it is not quite gone, but has left ſome remains of it to draw our attention.

The property of clouds is to be thin and airy, both in ſhape and colour: their ſhapes, though infinite, muſt be ſtudied and choſen after nature, at ſuch times as they appear fine. To make them look thin, we ought to make their grounds unite thinly with them, eſpecially near their extremities, as if they were tranſparent: And if we would have them thick, their reflections muſt be ſo managed, as, without deſtroying their thinneſs, they may ſeem to wind and unite, if neceſſary, with the clouds that are next to them. Little clouds often diſcover a little manner, and ſeldom have a good effect, unleſs when, being near each other, they ſeem all together to make but one object.

In ſhort, the character of the ſky is to be luminous; and, as it is even the ſource of light, every thing that is upon the earth muſt yield to it in brightneſs: If however there is any thing that comes near it in light, it muſt be waters, and poliſhed bodies which are ſuſceptible of luminous reflections.

But, whilſt the painter makes the ſky luminous, he muſt not repreſent it always ſhining throughout.

On the contrary, he muſt contrive his light ſo, that the greateſt part of it may fall only upon one place: and, to make it more apparent, he muſt take as much care as poſſible to put it in oppoſition to ſome terreſtrial object, that may render it more lively by its dark colour; as a tree, tower, or ſome other building that is a little high.

This principal light might alſo be heightened, by a certain diſpoſition of clouds having a ſuppoſed light, or a light ingeniouſly incloſed between clouds, whoſe ſweet obſcurity ſpreads itſelf by little and little on all hands. We have a great many examples of this in the Flemiſh ſchool, which beſt underſtood landſkip;

as Paul Bril, Brugel, Saveri: And the Sadelers and Merian's prints give a clear idea of it, and wonderfully awaken the genius of thoſe who have the principles of the *claroſcuro*.

26. *Of Offſkips and Mountains.* Offſkips have a near affinity with the ſky; it is the ſky which determines either the force or faintneſs of them. They are darkeſt when the ſky is moſt loaded, and brighteſt when it is moſt clear. They ſometimes intermix their ſhapes and lights; and there are times, and countries, where the clouds paſs between the mountains, whoſe tops riſe and appear above them. Mountains that are high, and covered with ſnow, are very proper to produce extraordinary effects in the offſkip, which are adantageous to the painter, and pleaſing to the ſpectator.

The diſpoſition of offſkips is arbitrary; let them only agree with the whole together of the picture, and the nature of the country we would repreſent. They are uſually blue, becauſe of the interpoſition of air between them and the eye: but they loſe this colour by degrees, as they come nearer the eye, and ſo take that which is natural to the objects.

In diſtancing mountains, we muſt obſerve to join them inſenſibly by the roundings off, which the reflections make probable; and muſt, among other things, avoid a certain edgineſs in their extremities, which makes them appear in ſlices, as if cut with ſciſſors, and ſtuck upon the cloth.

We muſt further obſerve, that the air, at the feet of mountains, being charged with vapours, is more ſuſceptible of light than at their tops. In this caſe, we ſuppoſe the main light to be ſet reaſonably high, and to enlighten the mountains equally, or that the clouds deprive them of the light of the ſun. But if we ſuppoſe the main light to be very low, and to ſtrike the mountains; then their tops will be ſtrongly enlightened, as well as every thing elſe in the ſame degree of light.

Though the forms of things diminiſh in bigneſs, and colours loſe their ſtrength, in proportion as they recede from the firſt plan of the picture, to the moſt remote offſkip, as we obſerve in nature and common practice; yet this does not exclude the uſe of the accidents. Theſe contribute greatly to the wonderful in landſcape, when they are properly introduced, and when the artiſt has a juſt idea of their good effects.

27. *Of Verdure, or Turfing.* By turfing is meant the greenneſs with which the herbs colour the ground: This is done ſeveral ways; and the diverſity proceeds not only from the nature of plants, which, for the moſt part, have their particular verdures, but alſo from the change of ſeaſons, and the colour of the earth, when the herbs are but thin ſown. By this variety, a painter may chooſe or unite, in the ſame tract of land, ſeveral ſorts of greens, intermixed and blended together, which are often of great ſervice to thoſe who know how to uſe them; becauſe this diverſity of greens, as it is often found in nature, gives a character of truth to thoſe parts, where it is properly uſed. There is a wonderful example of this part of landſcape, in the view of Mechlin, by Rubens.

28. *Of Rocks.* Though rocks have all ſorts of ſhapes, and participate of all colours, yet there are, in their diverſity, certain characters which cannot be well expreſſed without having recourſe to nature. Some are in banks, and ſet off with beds of ſhrubs; others in huge blocks, either projecting or falling back; others conſiſt of large broken parts, contiguous to each other; and others, in ſhort, of an enormous ſize, all in one ſtone, either naturally, as free-ſtone, or elſe through the injuries of time, which in the courſe of many ages has worn away their marks of ſeparation. But, whatever their form be, they are uſually ſet out with clefts, breaks, hollows, buſhes, moſs, and the ſtains of time; and theſe particulars, well managed, create a certain idea of truth.

Rocks are of themſelves gloomy, and only proper for ſolitudes: but where accompanied with buſhes, they inſpire a freſh air; and, when they have waters, either proceeding from, or waſhing them, they give an infinite pleaſure, and ſeem to have a ſoul which animates them, and makes them ſociable.

29. *Of Grounds or Lands.* A ground or land, in painters terms, is a certain diſtinct piece of land, which is neither too woody nor hilly. Grounds contribute, more than any thing, to the gradation and diſtancing of landſcape; becauſe they follow one another, either in ſhape, or in the *claro-obſcuro*, or in their variety of colouring, or by ſome inſenſible conjunction of one with another.

Multiplicity of grounds, though it be often contrary to grand manner, does not quite deſtroy it; for, beſides the extent of country which it exhibits, it is ſuſceptible of the accidents we have mentioned, and which, with good management, have a fine effect.

There is one nicety to be obſerved in grounds, which is, that in order to characterize them well, care muſt be taken, that the trees in them have a different verdure and different colours from thoſe grounds; though this difference, withal, muſt not be too apparent.

30. *Of Terraces.* A terrace, in painting, is a piece of ground, either quite naked, or having very little herbage, like great roads and places often frequented. They are of uſe chiefly in the foregrounds of a picture, where they ought to be very ſpacious and open, and accompanied, if we think fit, with ſome accidental verdure, and alſo with ſome ſtones, which, if placed with judgment, give a terrace a greater air of probability.

31. *Of Buildings.* Painters mean by buildings any ſtructures they generally repreſent, but chiefly ſuch as are of a regular architecture, or at leaſt are moſt conſpicuous. Thus building is not ſo proper a name for the houſes of country-people, or the cottages of ſhepherds, which are introduced into the *rural* taſte, as for regular and ſhowy edifices, which are always brought into the *heroic*.

Buildings in general are a great ornament in landſcapes, even when they are Gothic, or appear partly inhabited and partly ruinous: they raiſe the imagination by the uſe they are thought to be deſigned for; as appears from ancient towers, which ſeem to have been the habitations of fairies, and are now retreats for ſhepherds and owls.

Pouſſin has very elegantly handled the Roman manner of architecture in his works, as Bourbon has done the Gothic; which, however Gothic, fails not to give a ſublime air to his landſcapes. Little Bernard has introduced into his ſacred hiſtory what may be called a Babylonian manner; which, extraordinary as it is, has its grandeur and magnificence. Nor ought ſuch pieces of architecture to be quite rejected: they raiſe the imagination; and perhaps would ſucceed in the heroic ſtyle, if they were placed among half-diſtant objects, and if we knew how to uſe them properly.

32. *Of Waters.* Much of the ſpirit of landſcape is owing to the waters which are introduced in it. They appear in divers manners; ſometimes impetuous, as when a ſtorm makes them overflow their banks; at other times rebounding, as by the fall of a rock; at other times, through unuſual preſſure, guſhing out and dividing into an infinity of ſilver ſtreams, whoſe motion and murmuring agreeably deceive both the eye and ear; at other times calm and purling in a ſandy bed; at other times ſo ſtill and ſtanding, as to become a faithful looking-glaſs, which doubles all the objects that are oppoſite to it; and in this ſtate they have more life than in the moſt violent agitation. Conſult Bourdon's works, or at leaſt his prints, on this ſubject: he is one of thoſe who have treated of waters with the greateſt ſpirit and beſt genius.

Waters are not proper for every ſituation: but to expreſs them well, the artiſt ought to be perfect maſter of the exactneſs of watery reflexions; becauſe they only make painted water appear as real: for practice alone, without exactneſs, deſtroys the effect, and abates the pleaſure of the eye. The rule for theſe reflections is very eaſy, and therefore the painter is the leſs pardonable for neglecting it.

But it muſt be obſerved, that though water be as a looking-glaſs, yet it does not faithfully repreſent objects but when it is ſtill; for if it be in any motion, either in a natural courſe, or by the driving of the wind, its ſurface, becoming uneven, receives on its ſurges ſuch lights and ſhades, as, mixing with the appearance of the objects, confound both their ſhapes and colours.

33. *Of the Foreground of a Picture.* As it is the part of the foreground to uſher the eye into the piece, great care muſt be taken that the eye meet with good reception; ſometimes by the opening of a fine terrace, whoſe deſign and workmanſhip may be equally curious; ſometimes by a variety of well-diſtinguiſhed plants, and thoſe ſometimes flowered; and at other times, by figures in a lively taſte, or other objects, either admirable for their novelty, or introduced as by chance.

In a word, the artiſt cannot too much ſtudy his foreground objects, ſince they attract the eye, impreſs the firſt character of truth, and greatly contribute to make the artifice of a picture ſucceſsful, and to anticipate our eſteem for the whole work.

34. *Of Plants.* Plants are not always neceſſary in foregrounds, becauſe, as we have obſerved, there are ſeveral ways of making thoſe grounds agreeable. But if we reſolve to draw plants there, we ought to paint them exactly after the life; or at leaſt, among ſuch as we paint practically, there ought to be ſome more finiſhed than the reſt, and whoſe kinds may be diſtinguiſhed by the difference of deſign and colouring, to the end that, by a probable ſuppoſition, they may give the others a character of truth. What has been ſaid here of plants, may be applied to the branches and barks of treees.

35. *Of Figures.* In compoſing landſcape, the artiſt may have intended to give it a character agreeable to the ſubject he has choſen, and which his figures ought to repreſent. He may alſo, and it commonly happens, have only thought of his figures, after finiſhing his landſcape. The truth is, the figures in moſt landſcapes are made rather to accompany than to ſuit them.

It is true, there are landſcapes ſo diſpoſed and ſituated, as to require only paſſing figures; which ſeveral good maſters, each in his ſtyle, have introduced, as Pouſſin in the heroic, and Fouquier in the rural, with all probability and grace. It is true alſo, that reſting figures have been made to appear inwardly active. And theſe two different ways of treating figures are not to be blamed, becauſe they act equally, tho' in a different manner. It is rather inaction that ought to be blamed in figures; for in this condition, which robs them of all connection with the landſcape, they appear to be paſted on. But without obſtructing the painter's liberty in this reſpect, undoubtedly the beſt way to make figures valuable is, to make them ſo to agree with the character of the landſcape, that it may ſeem to have been made purely for the figures. We would not have them either inſipid or indifferent, but to repreſent ſome little ſubject to awaken the ſpectator's attention, or elſe to give the picture a name of diſtinction among the curious.

Great care muſt be taken to proportion the ſize of the figures to the bigneſs of the trees, and other objects of the landſcape. If they be too large, the picture will diſcover a little manner; and if too ſmall, they will have the air of pigmies: which will deſtroy the worth of them, and make the landſcape look enormous. There is, however, a greater inconvenience in making figures too large than too ſmall; becauſe the latter at leaſt gives an air of greatneſs to all the reſt. But as landſcape figures are generally ſmall, they muſt be touched with ſpirit, and ſuch lively figures as will attract, and yet preſerve probability and a general union. The artiſt muſt, in fine, remember, that as the figures chiefly give life to a landſcape, they muſt be diſperſed as conveniently as poſſible.

36. *Of Trees.* The beauty of trees is perhaps one of the greateſt ornaments of landſcape; on account of the variety of their kinds, and their freſhneſs, but chiefly their lightneſs, which makes them ſeem, as being expoſed to the air, to be always in motion.

Though diverſity be pleaſing in all the objects of landſkip, it is chiefly in trees that it ſhews its greateſt beauty. Landſkip conſiders both their kinds and their forms. Their kinds require the painter's particular ſtudy and attention, in order to diſtinguiſh them from each other; for we muſt be able at firſt ſight to diſcover which are oaks, elms, firs, ſycamores, poplars, willows, pines, and other ſuch trees, which, by a ſpecific colour, or touching, are diſtinguiſhable from all other kinds. This ſtudy is too large to be acquired in all its extent; and, indeed, few painters have attained ſuch a competent exactneſs in it as their art requires. But it is evident, that thoſe who come neareſt to perfection in it, will make their works infinitely pleaſing, and gain a great name.

Beſides the variety which is found in each kind of tree, there is in all trees a general variety. This is obſerved in the different manners in which their branches are diſpoſed by a ſport of nature; which takes delight in making ſome very vigorous and thick, others more dry and thin; ſome more green, others more red or yellow. The excellence of practice lies in the mixture of theſe varieties: but if the artiſt can diſtinguiſh the ſorts but indifferently, he ought at leaſt to vary their makes and colours; becauſe repetition in landſcape is as tireſome to the eye, as monotony in diſcourſe is to the ear.

The variety of their makes is ſo great, that the painter would be inexcuſable not to put it in practice upon occaſion, eſpecially when he finds it neceſſary to awaken the ſpectator's attention; for, among trees, we diſcover the young and the old, the open and cloſe, tapering, and ſquat, bending upwards and downwards, ſtooping and ſhooting: in ſhort, the variety is rather to be conceived than expreſſed. For inſtance, the character of young trees is, to have long ſlender branches, few in number, but well ſet out; boughs well divided, and the foliage vigorous and well ſhaped: whereas, in old trees, the branches are ſhort, ſtocky, thick, and numerous; the tufts blunt, and the foliage unequal and ill ſhaped: but a little obſervation and genius will make us perfectly ſenſible of theſe particulars.

In the various makes of trees, there muſt alſo be a diſtribution of branches, that has a juſt relation to, and probable connection with, the boughs or tufts, ſo as mutually to aſſiſt each other in giving the tree an appearance of thickneſs and of truth. But, whatever their natures or manners of branching be, let it be remembered, that the handling muſt be lively and thin, in order to preſerve the ſpirit of their characters.

Trees likewiſe vary in their barks, which are commonly grey; but this grey, which in thick air, and low and marſhy places, looks blackiſh, appears lighter in a clear air: and it often happens, in dry places, that the bark gathers a thin moſs, which makes it look quite yellow; ſo that, to make the bark of a tree apparent, the painter may ſuppoſe it to be light upon a dark ground, and dark on a light one.

The obſervation of the different barks merits a particular attention; for it will appear, that, in hard woods, age chaps them, and thereby gives them a ſort of embroidery; and that, in proportion as they grow old, theſe chaps grow more deep. And other accidents in barks may ariſe either from moiſture, or dryneſs, or green moſſes, or white ſtains of ſeveral trees.

The barks of white woods will alſo afford much matter for practice, if their diverſity be duly ſtudied: and this conſideration leads us to ſay ſomething of the ſtudy of landſkip.

37. *Of the ſtudy of Landſcape.* The ſtudy of landſcape may be conſidered either with reſpect to beginners, or to thoſe who have made ſome advances in it.

Beginners will find, in practice, that the chief trouble of landſcape lies in handling trees; and it is not only in practice, but alſo in ſpeculation, that trees are the moſt difficult part of landſcape, as they are its greateſt ornament. But it is only propoſed here, to give beginners an idea of trees in general, and to ſhew them how to expreſs them well. It would be needleſs to point out to them the common effects of trees and plants, becauſe they are obvious to every one; yet there are ſome things, which, though not unknown, deſerve our reflection. We know, for inſtance, that all trees require air, ſome more, ſome leſs, as the chief cauſe of their vegetation and production; and for this reaſon, all trees (except the cypreſs, and ſome others of the ſame kind) ſeparate in their growth from one another and from other ſtrange bodies as much as poſſible, and their branches and foliage do the ſame: wherefore, to give them that air and thinneſs, which is their principal character, the branches, boughs, and foliage, muſt appear to fly from each other, to proceed from oppoſite parts, and be well divided. And all this without order; as if chance aided nature in the fanciful diverſity. But to ſay particularly how theſe trunks, branches, and foliages, ought to be diſtributed, would be needleſs, and only a deſcription of the works of great maſters: a little reflection on nature will be of more ſervice than all that can be ſaid on this head. By great maſters, we mean, ſuch as have publiſhed prints; for thoſe will give better ideas to young copyiſts, than even the paintings themſelves.

Among the many great maſters of all ſchools, Du Pile prefers Titian's wooden prints, where the trees are well-ſhaped; and thoſe which Cornelius Cort, and Agoſtino Carracche, have engraved. And he aſſerts, that beginners can do no better than contract, above all things, an habit of imitating the touches of theſe great maſters, and of conſidering, at the ſame time, the perſpective of the branches and foliages, and obſerving how they appear, either when riſing and ſeen from below, or when ſinking and ſeen from above, or when fronting and viewed from a point, or when they appear in profile; and, in a word, when ſet in the various views in which nature preſents them, without altering their characters.

After having ſtudied and copied, with the pen or crayon, firſt the prints, and then the deſigns of Titian and Carracche, the ſtudent ſhould imitate with the pencil thoſe touches which they have moſt diſtinctly ſpecified, if their paintings can be procured: but ſince they are ſcarce, others ſhould be got which have a good character for their touching; as thoſe of Fouquier, who is a moſt excellent model: Paul Bril, Breugel, and Bourdon, are alſo very good; their touching is neat, lively, and thin.

After having duly weighed the nature of trees, their ſpread and order, and the diſpoſition of their branches, the artiſt muſt get a lively idea of them, in order to keep up the ſpirit of them throughout, either by making them apparent and diſtinct in the foregrounds, or obſcure and confuſed in proportion to their diſtance.

After having thus gained ſome knowledge in good manner, it will next be proper to ſtudy after nature, and to chooſe and rectify it according to the idea which the aforeſaid great maſters had of it. As to perfection, it can only be expected from long practice and perſeverance. This, we think, is what concerns thoſe, who, having an inclination for landſcape, would take the proper methods for beginning it well.

As for thoſe who have made ſome advances in this part of painting, it is proper they ſhould collect the neceſſary materials for their further improvement, and ſtudy thoſe objects at leaſt, which they ſhall have moſt frequent occaſion to repreſent.

Painters uſually compriſe, under the word *ſtudy*, any thing whatever, which they either deſign or paint ſeparately, after the life; whether figures, heads, feet, hands, draperies, animals, mountains, trees, plants, flowers, fruits, or whatever may confirm them in the juſt imitation of nature: the drawing of theſe things is what they call *ſtudy;* whether they be for inſtruction in deſign, or only to aſſure them of the truth, and to perfect their work. In fact, this word *ſtudy* is the more properly uſed by painters, as in the diverſity of nature they are daily making new diſcoveries, and confirming themſelves in what they already know.

As the landſcape-painter need only ſtudy ſuch objects as are to be met with in the country, we would recommend to him ſome order, that his drawings may be always at hand when he wants them. For inſtance, he ſhould copy after nature, on ſeparate papers, the different effects of trees in general, and the different effects of each kind in particular, with their trunks, foliage, and colours. He ſhould alſo take the ſame method with ſome ſorts of plants; becauſe their variety is a great ornament to terraces on fore-grounds. He ought likewiſe to ſtudy the effects of the ſky in the ſeveral times of the day, and ſeaſons of the year, in the various diſpoſitions of clouds, both in ſerene, thundering, and ſtormy weather; and in the off-ſkip, the ſeveral ſorts of rocks, waters, and other principal objects.

Theſe drawings, which may be made at times, ſhould be collected together; and all that relate to one matter be put into a book, to which the artiſt may have recourſe at any time for what he wants.

Now, if the fine effects of nature, whether in ſhape or colour, whether for an entire picture or a part of one, be the artiſt's ſtudy; and if the difficulty lies in chooſing thoſe effects well, he muſt for this purpoſe be born with good ſenſe, good taſte, and a fine genius; and this genius muſt be cultivated by the obſervations which ought to be made on the works of the beſt maſters, how they chooſe nature, and how, while they corrected her, according to their art, they preſerved her character. With theſe advantages, derived from nature, and perfected by art, the painter cannot fail to make a good choice; and, by diſtinguiſhing between the good and the bad, muſt needs find great inſtruction, even from the moſt common things.

To improve themſelves in this kind of ſtudies, painters have taken ſeveral methods.

There are ſome artiſts who have deſigned after nature, and in the open fields; and have there quite finiſhed thoſe parts which they had choſen, but without adding any colour to them.

Others have drawn, in oil-colours, in a middle-tint, on ſtrong paper; and found this method convenient, becauſe, the colours ſinking, they could put colour on colour, though different from each other. For this purpoſe they took with them a flat box, which commodiouſly held their pallet, pencils, oil, and colours. This method, which indeed requires ſeveral implements, is doubtleſs the beſt for drawing nature more particularly, and with greater exactneſs, eſpecially if, after the work be dry and varniſhed, the artiſt return to the place where he drew, and retouch the principal things after nature.

Others have only drawn the out-lines of objects, and ſlightly waſhed them in colours near the life, for the eaſe of their memory. Others have attentively obſerved ſuch parts as they had a mind to retain, and contented themſelves with committing them to their memory, which upon occaſion gave them a faithful account of them. Others have made drawings in paſtil and waſh together. Others, with more curioſity and patience, have gone ſeveral times to the places which were to their taſte: the firſt time they only made choice of the parts, and drew them correctly; and the other times were ſpent in obſerving the variety of colouring, and its alterations through change of light.

Now theſe ſeveral methods are very good, and each may be practiſed as beſt ſuits the ſtudent and his temper: but they require the neceſſaries of painting, as colours, pencils, paſtils, and leiſure. Nature, however, at certain times, preſents extraordinary, but tranſient beauties, and ſuch as can be of no ſervice to the artiſt who has not as much time as is neceſſary to imitate what he admires. The beſt way, perhaps, to make advantage of ſuch momentary occaſions, is this:

The painter being provided with a quire of paper, and a black-lead pencil, let him quickly, but ſlightly, deſign what he ſees extraordinary; and, to remember the colouring, let him mark the principal parts with characters, which he may explain at the bottom of the paper, as far as is neceſſary for himſelf to underſtand them: a cloud, for inſtance, may be marked A, another cloud B, a light C, a mountain D, a terrace E, and ſo on. And having repeated theſe letters at the bottom of the paper, let him write againſt each, that it is of ſuch or ſuch a colour; or for greater brevity, only *blue*, *red*, *violet*, *grey*, &c. or any other ſhorter abbreviation. After this, he muſt go to painting as ſoon as poſſible; otherwiſe moſt of what he has obſerved will, in a little time, ſlip out of his memory. This method is the more uſeful, as it not only prevents our loſing an infinity of ſudden and tranſitory beauties, but alſo helps, by means of the aforeſaid marks and characters, to perfect the other methods we have mentioned.

If it be aſked, Which is the propereſt time for theſe ſtudies? the anſwer is, That nature ſhould be ſtudied at all times, becauſe ſhe is to be repreſented at all ſeaſons; but autumn yields the moſt plentiful harveſt for her fine effects: the mildneſs of that ſeaſon, the beauty of the ſky, the richneſs of the earth, and the variety of objects, are powerful inducements with the painter to make the proper inquiries for improving his genius and perfecting his art.

But as we cannot ſee or obſerve every thing, it is very commendable to make uſe of other mens ſtudies, and to look upon them as if they were our own. Raphael ſent ſome young men into Greece to deſign ſuch things as he thought would be of ſervice to him, and accordingly made uſe of them to as good purpoſe as if he himſelf had deſigned them on the ſpot: for this, Raphael is ſo far from deſerving cenſure, that he ought, on the contrary, to be commended; as an example, that painters ought to leave no way untried for improving in their profeſſions. The landſcape painter may, accordingly, make uſe of the works of all thoſe who have excelled in any kind, in order to acquire a good manner; like the bees, which gather their variety of honey from different flowers.

38. *General remarks on Landſcapes.* As the general rules of painting are the baſis of all the ſeveral kinds of it, we muſt refer the landſcape painter to them, or rather ſuppoſe him to be well acquainted with them. We ſhall here only make ſome general remarks on this kind of painting.

I. Landſcape ſuppoſes the knowledge and practice of the principal rules in *perſpective*, in order to maintain probability.

II. The nigher the leaves of trees are to the earth, the larger they are, and the greener; as being apteſt to receive, in abundance, the ſap which nouriſhes them: and the upper branches begin firſt to take the redneſs or yellowneſs which colours them in autumn. But it is otherwiſe in plants; for their ſtocks renew all the year round, and their leaves ſucceed one another, at a conſiderable diſtance of time, inſomuch that nature, employed in producing new leaves to adorn the ſtock as it riſes, does by degrees deſert the under ones; which, having firſt performed their office, are the firſt that die: but this effect is more viſible in ſome than in others.

III. The under parts of all leaves are of a brighter green than the upper, and almoſt always incline to the ſilveriſh; and thoſe which are wind-ſhaken are known from others by that colour: but if we view them from beneath, when penetrated by the ſun's rays, they diſcover ſuch a fine and lively green as is far beyond all compariſon.

IV. There are five principal things which give ſpirit to landſcape, *viz.* figures, animals, waters, wind-ſhaken trees, and thinneſs of pencilling; to which add ſmoke, when there is occaſion to introduce it.

V. When one colour predominates throughout a landſcape, as one green in ſpring, or one red in autumn, the piece will look either as of one colour, or elſe as unfiniſhed. We have ſeen many of Bourdon's landſcapes, which, by handling the corn one way throughout, have loſt much of their beauty, though the ſituations and waters were very pleaſant. The ingenious painter muſt endeavour to correct, and, as they ſay, redeem the harſh unſightly colouring of winter and ſpring by means of figures, waters, and buildings; for ſummer and autumn ſubjects are of themſelves capable of great variety.

VI. Titian and Carrache are the beſt models for inſpiring good taſte, and leading the painter into a good track, with regard to forms and colours. He muſt uſe all his efforts to gain a juſt idea of the principles which thoſe great men have left us in their works; and to have his imagination filled with them, if he would advance by degrees towards that perfection which the artiſt ſhould always have in view.

VII. The landſcapes of theſe two maſters teach us a great many things, of which diſcourſe can give us no exact idea, nor any general principle. Which way, for example, can the meaſures of trees in general be determined, as we determine thoſe of the human body? The tree has no ſettled proportions; moſt of its beauty lies in the contraſt of its branches, an unequal diſtribution of boughs, and, in ſhort, a kind of whimſical variety, which nature delights in, and of which the painter becomes a judge when he has thoroughly reliſhed the works of the two maſters aforeſaid. But we muſt ſay, in Titian's praiſe, that the path he ſtruck out is the ſureſt; becauſe he has exactly imitated nature in its variety with an exquiſite taſte, and fine colouring: whereas Carrache, though an able artiſt, has not, more than others, been free from manner in his landſcapes.

VIII. One of the greateſt perfections of landſcape, in the variety it repreſents, is a faithful imitation of each particular character: as its greateſt fault is, a licentious practice, which brings us to do things by rote.

IX. Among thoſe things which are painted practically, we ought to intermix ſome done after nature, to induce the ſpectator to believe that all are ſo.

X. As there are ſtyles of thought, ſo there are alſo ſtyles of execution. We have handled the two relating to thought, viz. the heroic and paſtoral; and find that there are two alſo with regard to execution, viz. the firm ſtyle, and the poliſhed; theſe two concern the pencil, and the more or leſs ingenious way of conducting it. The firm ſtyle gives life to work, and excuſe for bad choice: and the poliſhed finiſhes and brightens every thing; it leaves no employment for the ſpectator's imagination, which pleaſes itſelf in diſcovering and finiſhing things which it aſcribes to the artiſt, though, in fact, they proceed only from itſelf. The poliſhed ſtyle degenerates into the ſoft and dull, if not ſupported by a good opening or ſituation; but when thoſe two characters meet, the picture is fine.

SECT. III. *Of Portraiture.*

39. If painting be an imitation of nature, it is doubly ſo in a portrait; which not only repreſents a man in general, but ſuch an one as may be diſtinguiſhed from all others. And as the greateſt perfection of a portrait is extreme likeneſs, ſo the greateſt of its faults is to reſemble a perſon for whom it was not made; ſince there are not in the world two perſons quite like one another. But before we proceed to the particulars which let us into the knowledge of this imitation, it is neceſſary, for ſhortening this part of our ſubject, to attend to ſome general propoſitions.

I. Imitation is the eſſence of painting: and good choice is to this eſſence what the virtues are to a man; they raiſe the value of it. For this reaſon, it is extremely the painter's intereſt to chooſe none but good heads, or favourable moments for drawing them, and ſuch poſitions as may ſupply the want of a fine natural.

II. There are views of the natural, more or leſs advantageous; all depends upon turning it well, and taking it in the favourable moment.

III. There is not a ſingle perſon in the world who has not a peculiar character, both in body and face.

IV. Simple and genuine nature is more proper for imitation; and is a better choice than nature much formed, and embelliſhed too artificially.

V. To adorn nature too much, is doing it a violence; and the action which attends it can never be free, when its ornaments are not eaſy. In ſhort, in proportion as we adorn nature, we make it degenerate from itſelf, and bring it down to art.

VI. Some means are more advantageous than others, to come at the ſame end.

VII. We muſt not only imitate what we do ſee in nature, but alſo what we may poſſibly ſee that is advantageous in art.

VIII. Things are valuable by compariſon; and it is only by this we are enabled to make a right judgment of them.

IX. Painters eaſily accuſtom themſelves to their own tints, and the manner of their maſters: and after this habit is rooted in them, they view nature, not as ſhe really is, but as they are uſed to paint her.

X. It is very difficult to make a picture, the figures of which are as big as the life, to have its effect near, as at a diſtance. A learned picture pleaſes the ignorant only when it is at ſome diſtance; but judges will admire its artifice near, and its effect at a diſtance.

XI. Knowledge makes work pleaſant and eaſy. The traveller who knows his road, comes to his journey's end with more ſpeed and certainty than he who inquires and gropes it out.

XII. It is proper, before we begin a work, to meditate upon it, and to make a nice coloured ſketch of it, for our own ſatisfaction, and an help to the memory.

We cannot too much reflect on theſe propoſitions; and it is neceſſary to be well acquainted with them, that they may preſent themſelves to our mind, of their own accord, without our being at the trouble to recal them to our memory, when we are at work.

There are four things neceſſary to make a portrait perfect; *air*, *colouring*, *attitude*, and *dreſs*.

40. *Of Air.* The air reſpects the lines of the face, the head-attire, and the ſize.

The lines of the face depend upon exactneſs of draught, and agreement of the parts; which all together muſt repreſent the phyſiognomy of the perſon painted in ſuch a manner, that the picture of his body may ſeem to be alſo that of his mind.

It is not exactneſs of deſign in portraits that gives ſpirit and true air, ſo much as the agreement of the parts at the very moment when the diſpoſition and temperament of the ſitter are to be hit off. We ſee ſeveral portraits which, though correctly deſigned, have a cold, languiſhing, and ſtupid air; whilſt others, leſs correct in deſign, ſtrike us however, at firſt ſight, with the ſitter's character.

Few painters have been careful enough to put the parts well together: Sometimes the mouth is ſmiling, and the eyes are ſad; at other times, the eyes are cheerful, and the cheeks lank: by which means their work has a falſe air, and looks unnatural. We ought therefore to mind, that, when the ſitter puts on a ſmiling air, the eyes cloſe, the corners of the mouth draw up towards the noſtrils, the cheeks ſwell, and the eyebrows widen: but in a melancholy air, theſe parts have a contrary effect.

The eye-brows, being raiſed, give a grave and noble air; but if arched, an air of aſtoniſhment.

Of all the parts of the face, that which contributes moſt to likeneſs is the noſe; it is therefore of great moment to ſet and draw it well.

Though the hair of the head ſeems to be part of the dreſs, which is capable of various forms, without altering the air of the face; yet the head-attire which one has been moſt accuſtomed to creates ſuch a likeneſs, that we ſcarce know a familiar acquaintance on his putting on a periwig ſomewhat different from that which he uſed to wear. It is neceſſary therefore, as far as poſſible, to take the air of the head-ornament, and make it accompany and ſet off that of the face, if there be no reaſon to the contrary.

As to the ſtature, it contributes ſo much to likeneſs, that we very often know people without ſeeing their face: It is therefore extremely proper to draw the ſize after the ſitter himſelf, and in ſuch an attitude as we think fit; which was Vandyke's method. Here let us remark, that, in ſitting, the perſon appears to be of a leſs free make, through the heaving of his ſhoulders; wherefore, to adjuſt his ſize, it is proper to make him ſtand for a ſmall time, ſwaying in the poſture we would give him, and then make our obſervation. But here occurs a difficulty, which we ſhall endeavour to examine: "Whether it is proper, in portraiture, to correct the defects of nature?"

Likeneſs being the eſſence of portraiture, it would ſeem that we ought to imitate defects as well as beauties, ſince by this means the imitation will be more complete: It would be even hard to prove the contrary to one who would undertake the defence of this poſition. But ladies and gentlemen do not much approve of thoſe painters who entertain ſuch ſentiments, and put them in practice. It is certain that ſome complaiſance in this reſpect is due to them; and there is little doubt but their pictures may be made to reſemble, without diſpleaſing them: for the effectual likeneſs is a juſt agreement of the parts that are painted with thoſe of nature; ſo that we may be at no loſs to know the air of the face, and the temper of the perſon, whoſe picture is before us. All deformities, therefore, when the air and temper may be diſcovered without them, ought to be either corrected or omitted in womens and young mens portraits. A noſe ſomewhat awry may be helped, or a ſhrivelled neck, or high ſhoulders, adapted to good air, without going from one extreme to another. But this muſt be done with great diſcretion: for, by endeavouring to correct nature too much, we inſenſibly fall into a method of giving a general air to all our portraits; juſt as, by confining ourſelves too much to the defects and littleneſs of nature, we are in danger of falling into the low and taſteleſs manner.

But in the faces of heroes and men of rank, diſtinguiſhed either by dignities, virtues, or great qualities, we cannot be too exact, whether the parts be beautiful or not: for portraits of ſuch perſons are to be ſtanding monuments to poſterity; in which caſe, every thing in a picture is precious that is faithful. But after whatever manner the painter acquits himſelf in this point, let him never forget good air nor grace; and that there are, in the natural, advantageous moments for hitting them off.

41. *Of Colouring.*—Colouring, in portraiture, is an effuſion of nature, diſcovering the true tempers of perſons; and the temper being eſſential to likeneſs, it ought to be handled as exactly as the deſign. This part is the more valuable, as it is rare and difficult to hit. A great many painters have come to a likeneſs by ſtrokes and

outlines; but certainly they are few who have ſhewn in colours the tempers of perſons.

Two points are neceſſary in colouring; exactneſs of tints, and the art of ſetting them off. The former is acquired by practice, in examining and comparing the colours we ſee in life with thoſe by which we would imitate it: and the art of thoſe tints conſiſts in knowing what one colour will produce when ſet by another, and in making good what either diſtance or time may abate of the glow and freſhneſs of the colours.

A painter who does nothing more than what he ſees, will never arrive at a perfect imitation; for though his work may ſeem, on the eaſel, to be good to him, it may not appear ſo to others, and perhaps even to himſelf, at a diſtance. A tint which, near, appears diſjoined, and of one colour, may look of another at a diſtance, and be confounded in the maſs it belongs to. If you would have your work, therefore, to produce a good effect in the place where it is to hang, both the colours and lights muſt be a little loaded; but learnedly, and with diſcretion. In this point conſult Titian, Rubens, Vandyke, and Rembrandt's methods; for indeed their art is wonderful.

The tints uſually require three times of obſervation. The firſt is at the perſon's firſt ſitting down, when he has more ſpirit and colour than ordinary; and this is to be noted in the firſt hour of his ſitting. The ſecond is when, being compoſed, his look is as uſual; which is to be obſerved in the ſecond hour. And the third is when, through tireſomeneſs by ſitting in one poſture, his colour alters to what wearineſs uſually creates. On which account, it is beſt to keep to the ſitter's uſual tint, a little improved. He may alſo riſe, and take ſome turns about the room, to gain freſh ſpirits, and ſhake off or prevent tireſomeneſs.

In *draperies*, all ſorts of colours do not ſuit all ſorts of perſons. In mens portraits, we need only obſerve great truth, and great force: but in womens there muſt alſo be charms; whatever beauty they have muſt appear in a fine light, and their blemiſhes muſt by ſome means or other be ſoftened. For this reaſon, a white, lively, and bright tint, ought never to be ſet off by a fine yellow, which would make it look like plaſter; but rather by colours inclining to green, blue, or grey, or ſuch others as, by their oppoſition, may make the tint appear more fleſhy than uſual in fair women. Vandyke often made a fillemot-coloured curtain for his ground; but that colour is ſoft and brown. Brown women, on the other hand, who have yellow enough in their tints to ſupport the character of fleſhineſs, may very well have yellowiſh draperies, in order to bring down the yellow of their tints, and make them look the freſher; and, near very high-coloured and lively carnations, linen does wonders.

In *grounds*, two things are obſervable; the tone and the colour. The colour is to be conſidered in the ſame manner as thoſe of draperies, with reſpect to the head. The tone muſt be always different from the maſs it ſupports, and of which it is the ground, that the objects coming upon it may not ſeem tranſparent, but ſolid and raiſed. The colour of the hair of the head uſually determines the tone of the ground; and when the former is a bright cheſnut, we are often embarraſſed, unleſs helped by means of a curtain, or ſome accident of the *claro-obſcuro*, ſuppoſed to be behind, or unleſs the ground is a ſky.

We muſt further obſerve, that where a ground is neither curtain nor landſcape, or ſuch like, but is plain and like a wall, it ought to very much party-coloured, with almoſt imperceptible patches or ſtains; for, beſides its being ſo in nature, the picture will look the more grand.

42. *Of Attitude, or Poſture.* Attitudes ought to ſuit the ages and qualities of perſons and their tempers. In old men and women, they ſhould be grave, majeſtic, and ſometimes bold: and generally, in women, they ought to have a noble ſimplicity and modeſt cheerfulneſs; for modeſty ought to be the character of women; a charm infinitely beyond coquetry! and indeed coquettes themſelves care not to be painted ſuch.

Attitudes are of two kinds; one in motion, the other at reſt. Thoſe at reſt may ſuit every perſon: but thoſe in motion are proper for young people only, and are hard to be expreſſed; becauſe a great part of the hair and drapery muſt be moved by the air; motion, in painting, being never better expreſſed than by ſuch agitations. The attitudes at reſt muſt not appear ſo much at reſt as to ſeem to repreſent an inactive perſon, and one who ſits for no other purpoſe but to be a copy. And though the figure that is repreſented be at reſt, yet the painter, if he thinks fit, may give it a flying drapery, provided the ſcene or ground be not a chamber or cloſe place.

It is above all things neceſſary that the figures which are not employed ſhould appear to ſatisfy the ſpectator's curioſity; and for this purpoſe ſhew themſelves in ſuch an action as ſuits their tempers and conditions, as if they would inform him what they really were: and as moſt people pretend to ſincerity, honeſty, and greatneſs of mind, we muſt avoid, in attitudes, all manner of affectation; every thing there muſt appear eaſy and natural, and diſcover more or leſs ſpirit, nobleneſs, and majeſty, in proportion to the perſon's character and dignity. In a word, the attitudes are the language of portraits; and the ſkilful painter ought to give great attention to them.

But the beſt attitudes are ſuch as induce the ſpectator to think that the ſitter took a favourable opportunity of being ſeen to advantage, and without affectation. There is only one thing to be obſerved with regard to womens portraits, in whatever attitude they are placed; which is, that they ſway in ſuch a manner as to give their face but little ſhade; and that we carefully examine whether the lady appear moſt beautiful in a ſmiling or in a ſerious air, and conduct ourſelves accordingly. Let us now proceed to the next article.

43. *Of Practice in Portraiture.* According to De Piles, portraiture requires three different ſittings and operations; to wit, dead-colouring, ſecond-colouring, and retouching or finiſhing. Before the painter dead-colour, he muſt attentively conſider what aſpect will beſt ſuit the ſitter, by putting him in different poſitions, if we have not any ſettled deſign before us: and when we have determined this, it is of the laſt conſequence to put the parts well together, by comparing always one part with another; for not only the portrait acquires a greater likeneſs when well deſigned, but it is troubleſome to make alterations at the ſecond ſitting, when the artiſt muſt only think of painting,

that is, of diſpoſing and uniting his colours.

Experience tells us, that the dead-colouring ought to be clean, becauſe of the ſlope and tranſparency of the colours, eſpecially in the ſhades: and when the parts are well put together, and become clammy, they muſt be judiciouſly ſweetened and melted into each other; yet without taking away the air of the picture, that the painter may have the pleaſure of finiſhing it, in proportion as he draws. But if fiery geniuſes do not like this method of ſcumbling, let them only mark the parts ſlightly, and ſo far as is neceſſary for giving an air.

In dead-colouring, it is proper to put in rather too little than too much hair about the forehead; that, in finiſhing, we may be at liberty to place it where we pleaſe, and to paint it with all poſſible ſoftneſs and delicacy. If, on the contrary, you ſketch upon the forehead a lock which may appear to be of a good taſte, and becoming the work, you may be puzzled in finiſhing it, and not find the life exactly in the ſame poſition as you would paint it. But this obſervation is not meant for men of ſkill and conſummate experience, who have nature in their heads, and make her ſubmit to their ideas.

The buſineſs of the ſecond ſitting is, to put the colours well in their places, and to paint them in a manner that is ſuitable to the ſitter and to the effect we propoſe: But before they are made clammy, we ought to examine afreſh whether the parts are rightly placed, and here and there to give ſome touches towards likeneſs, that, when we are aſſured of it, the work may go on with greater ſatisfaction. If the painter underſtands what he is about, and the portrait be juſtly deſigned, he ought as much as poſſible to work quick; the ſitter will be better pleaſed, and the work will by this means have the more ſpirit and life. But this readineſs is only the effect of long ſtudy and experience; for we may well be allowed a conſiderable time to find out a road that is eaſy, and ſuch as we muſt often travel in.

Before we retouch or finiſh, it is proper to terminate the hair, that, on finiſhing the carnations, we may be abler to judge of the effect of the whole head.

If, at the ſecond ſitting, we cannot do all we intended, which often happens, the third makes up the loſs, and gives both ſpirit, phyſiognomy, and character.

If we would paint a portrait at once, we muſt load the colouring; but neither ſweeten, nor drive, nor very much oil it: and if we dip the pencil in varniſh as the work advances, this will readily enable us to put colour on colour, and to mix them without driving.

The uſe and ſight of good pictures give greater light into things than words can expreſs: What hits one artiſt's underſtanding and temper may be diſagreeable to another's; and almoſt all painters have taken different ways, though their principles were often the ſame.

We are told that a friend of Vandyke's having obſerved to him how little time he beſtowed on his portraits, Vandyke anſwered, "That at firſt he worked hard, and took great pains, to acquire a reputation, and alſo to get a ſwift hand, againſt the time he ſhould work for his kitchen." Vandyke's cuſtom is ſaid to have been this: He appointed both the day and hour for the perſon's ſitting, and worked not above an hour on any portrait, either in rubbing in or finiſhing; ſo that as ſoon as his clock informed him that the hour was out, he roſe up, and made a bow to the ſitter, to ſignify, that he had done enough for that day, and then appointed another hour ſome other day; whereupon his ſervant came to clean his pencils, and brought a freſh pallet, whilſt he was receiving another ſitter, whoſe day and hour he had before appointed. By this method he worked on ſeveral pictures the ſame day, with extraordinary expedition.

After having lightly dead-coloured the face, he put the ſitter into ſome attitude which he had before contrived; and on a grey paper, with white and black crayons, he deſigned, in a quarter of an hour, his ſhape and drapery, which he diſpoſed in a grand manner and an exquiſite taſte. After this, he gave the drawing to the ſkilful people he had about him, to paint after the ſitter's own cloaths, which, at Vandyke's requeſt, were ſent to him for that purpoſe. When his diſciples had done what they could to theſe draperies, he lightly went over them again; and ſo, in a little time, by his great knowledge, diſplayed the art and truth which we at this day admire in them. As for hands, he had in his houſe people of both ſexes, whom he paid, and who ſerved as models.

This conduct of Vandyke, however, is mentioned rather to gratify the reader's curioſity, than to excite his imitation; he may chooſe as much of it as he pleaſes and as ſuits his own genius, and leave the reſt.

We muſt obſerve by the way, that there is nothing ſo rare as fine hands, either in the deſign or colouring. It is therefore convenient to cultivate, if we can, a friendſhip with ſome women who will take pleaſure in ſerving for a copy: The way to win them is, to praiſe their beauty exceedingly. But if an opportunity ſerves of copying hands after Vandyke, it muſt not be let ſlip; for he drew them with a ſurpriſing delicacy, and an admirable colouring.

It is of great ſervice to copy after the manners which come neareſt to nature; as are thoſe of Titian and Vandyke. We muſt, at ſuch times, believe them to be nature itſelf; and, at ſome diſtance, conſider them as ſuch, and ſay to ourſelves—*What colour and tint ſhall I uſe for ſuch a part?* And then, coming near the picture, we ought to examine, whether we are right, or not; and to make a fixed rule of what we have diſcovered, and did not practiſe before without uncertainty.

It is recommended, before we begin colouring, to catch the very firſt moments, which are commonly the moſt agreeable and moſt advantageous, and to keep them in our memory for uſe when we are finiſhing: for the ſitter, growing tired with being long in the ſame place, loſes thoſe ſpirits, which, at his firſt ſitting down, gave beauty to the parts, and conveyed to the tint more lively blood, and a freſher colour. In ſhort, we muſt join to truth a probable and advantageous poſſibility, which, far from abating likeneſs, ſerves rather to ſet it off. For this end, we ought to begin with obſerving the ground of a tint, as well what it is in lights as in ſhades; for the ſhades are only beautiful as they are proportioned to the light. We muſt obſerve if the tint be very lively; whether it partake of yellowneſs, and where that yellowneſs is

placed;

Decorations &c.

placed; becauſe uſually, towards the end of the ſitting, fatigue diffuſes a general yellowneſs, which makes us forget what parts were of this colour, and what were not, unleſs we had taken due notice of it before. For this reaſon, at the ſecond ſitting, the colours muſt be every-where readily clapped in, and ſuch as appear at the firſt ſitting down; for theſe are always the fineſt.

The ſureſt way to judge of colours is by compariſon; and to know a tint, nothing is better than to compare it with linen placed next it, or elſe placed next to the natural object, if there is occaſion. We ſay this only to thoſe who have little practiſed nature.

The portrait being now ſuppoſed to be as much finiſhed as you are able, nothing remains, but, at ſome reaſonable diſtance, to view both the picture and ſitter together, in order to determine with certainty, whether there is any thing ſtill wanting to perfect the work.

SECT. IV. *Of Theatric Decorations; the Deſigns for Furniture, Embroidery, Carriages, &c.*

46. *Of Theatrical Decorations.* THIS is a particular art which unites ſeveral of the general parts of painting with the knowledge of architecture, perſpective, &c. They who apply themſelves to it, would do well to deſign their decorations by day, and to colour them by candle-light, as they will be much better able to judge of the effect of a painting intended to be viewed by that light. It is proper alſo to caution the young painter to avoid, as much as poſſible, the uniting the imitations of nature with nature itſelf; that is, he ſhould not introduce with his decorations living horſes, or other animals, real fountains or caſcades, trees, or ſtatues, &c. For ſuch combinations are the effect of ignorance and a bad taſte; they are the reſource of painters of little ability; they diſcover a ſterility of invention, and produce great inconvenience in the repreſentation. Thoſe pieces which they call moving pictures, where the painted landſcape remains immoveable, and the figures move by means of ſprings, form a part of theſe decorations; and there are ſome of them, as thoſe of Antwerp and Ghent, that have a pleaſing effect.

47. The deſigns for *furniture, carriages, porcelain,* and other branches of manufacture, form alſo a very important article of painting in general, and of academy painting in particular. This is a diſtinct branch of the art; and without doubt not the leaſt uſeful of its parts, as it concurs ſo eſſentially to the ſucceſs of manufactures, and conſequently to the proſperity of a ſtate: and it is an art, to which it were much to be wiſhed that youth of ability and invention would ap- apply themſelves. See the articles JAPANNING and PORCELAIN.

Materials, &c.

SECT. V. *Enumeration of the different Methods of Painting, or the different Means and Materials that painters make uſe of to imitate all viſible objects on a plane ſuperficies.*

48. THOSE now in practice are,

1. Painting in oil; which is preferable to all other other methods, as it is more ſuſceptible of all ſorts of expreſſions, of more perfect gradations of colours, and is at the ſame time more durable.

2. MOSAIC painting; an invention truly wonderful; it is compoſed of a great number of ſmall pieces of marble of different colours, joined together with ſtucco. The works of this kind are made principally at Rome, where this art has been carried ſo far as to reſemble the paintings of the greateſt maſters; and of theſe are made monuments for the lateſt poſterity.

Paintings in FRESCO; which is by drawing, with colours diluted with water, on a wall newly plaſtered, and with which they ſo incorporate, that they periſh only with the ſtucco itſelf. This is principally uſed on ceilings.

4. Painting in WATER-COLOURS; that is, with colours mixed with water and gum, or paſte, &c.

5. MINIATURE painting; which differs from the preceding only as it repreſents objects in the leaſt diſcernible magnitudes; and is conſequently vaſtly more delicate, ſeeing it is performed by the ſmalleſt ſtrokes poſſible; whereas the others have the full ſcope of the pencil.

6. Painting in CRAYONS; for which purpoſe colours, either ſimple or compound, are mixed with gum, and made into a kind of hard paſte like chalk, and with which they draw on paper or parchment.

7. Painting in ENAMEL; which is done on copper or gold, with mineral colours that are dried by fire, and become very durable. The paintings on the PORCELAIN of China and Europe, on Delpht ware, &c. are ſo many ſorts of enamel.

8. Painting in WAX, or ENCAUSTIC painting: This is a new invention, and in which there are in France performances highly pleaſing. It is done with wax mixed with varniſh and colours.

9. Painting on GLASS; of which there are various kinds.

See all the articles here enumerated, explained in the order of the alphabet.

PAIR; two of a ſort, a couple.

PAIRING, the uniting or joining in couples.

The inſtinct of pairing is beſtowed on every ſpecies of animals to which it is neceſſary for rearing their young; and on no other ſpecies. All wild birds pair; but with a remarkable difference between ſuch as place their neſts on trees, and ſuch as place them on the ground. The young of the former, being hatched blind, and without feathers, require the nurſing care of both parents till they be able to fly. The male feeds his mate on the neſt, and cheers her with a ſong. As ſoon as the young are hatched, ſinging yields to a more neceſſary occupation, that of providing food for a numerous iſſue; a taſk that requires both parents.

Eagles and other birds of prey build on trees, or on other inacceſſible ſpots. They not only pair, but continue in pairs all the year round; and the ſame pair procreates year after year. This at leaſt is the caſe of eagles: the male and female hunt together, unleſs during incubation, during which time the female is fed by the male. A greater number than a ſingle pair are never ſeen in company.

Pairing.

Gregarious birds pair, in order probably to prevent diſcord in a ſociety confined to a narrow ſpace. This is the caſe particularly of pigeons and rooks. The male and female ſit on the eggs alternately, and divide the care of feeding their young.

Partridges, plovers, pheaſants, ſea-fowl, grouſe, and other kinds that place their neſts on the ground, have the inſtinct of pairing; but differ from ſuch as build on trees in the following particular, that after the female is impregnated, ſhe completes her taſk without needing any help from the male. Retiring from him, ſhe chooſes a ſafe ſpot for her neſt, where ſhe can find plenty of worms and graſs-ſeed at hand; and her young, as ſoon as hatched, take foot, and ſeek food for themſelves. The only remaining duty incumbent on the dam is, to lead them to proper places for food, and to call them together when danger impends. Some males, provoked at the deſertion of their mates, break the eggs if they ſtumble on them. Eider ducks pair like other birds that place their neſts on the ground; and the female finiſhes her neſt with down plucked from her own breaſt. If the neſt be deſtroyed for the down, which is remarkably warm and elaſtic, ſhe makes another neſt as before. If ſhe is robbed a ſecond time, ſhe makes a third neſt; but the male furniſhes the down. A lady of ſpirit obſerved, that the eider duck may give a leſſon to many a married woman, who is more diſpoſed to pluck her huſband than herſelf. The black game never pair: in ſpring, the cock on an eminence crows, and claps his wings; and all the females within hearing inſtantly reſort to him.

Kames's Sketches, ol. i. p. 198.

Pairing birds, excepting thoſe of prey, flock together in February, in order to chooſe their mates. They ſoon diſperſe; and are not ſeen afterward but in pairs.

Pairing is unknown to quadrupeds that feed on graſs. To ſuch it would be uſeleſs; as the female gives ſuck to her young while ſhe herſelf is feeding. If M. Buffon deſerves credit, the roe-deer are an exception. They pair, though they feed on graſs, and have but one litter in a year.

Beaſts of prey, ſuch as lions, tygers, wolves, pair not. The female is left to ſhift for herſelf and for her young; which is a laborious taſk, and often ſo unſucceſsful as to ſhorten the life of many of them. Pairing is eſſential to birds of prey, becauſe incubation leaves the female no ſufficient time to hunt for food. Pairing is not neceſſary to beaſts of prey, becauſe their young can bear a long faſt. Add another reaſon, that they would multiply ſo faſt by pairing, as to prove troubleſome neighbours to the human race.

Among animals that pair not, males fight deſperately about a female. Such a battle among horned cattle is finely deſcribed by Lucretius. Nor is it unuſual for ſeven or eight lions to wage bloody war for a ſingle female.

The ſame reaſon that makes pairing neceſſary for gregarious birds, obtains with reſpect to gregarious quadrupeds; thoſe eſpecially who ſtore up food for winter, and during that ſeaſon live in common. Diſcord among ſuch would be attended with worſe conſequences than even among lions and bulls, who are not confined to one place. The beavers, with reſpect to pairing, reſemble birds that place their neſts on the ground. As ſoon as the young are produced, the males abandon their ſtock of food to their mates, and live at large; but return frequently to viſit them while they are ſuckling their young.

Hedgehogs pair as well as ſeveral of the monkey-kind. We are not well acquainted with the natural hiſtory of theſe animals; but it would appear that the young require the nurſing care of both parents.

Seals have a ſingular œconomy. Polygamy ſeems to be a law of nature among them, as a male aſſociates with ſeveral females. The ſea-turtle has no occaſion to pair, as the female concludes her taſk by laying her eggs in the ſand. The young are hatched by the ſun, and immediately crawl to the ſea.

Paiſley.

PAISLEY, a town of Renfrewſhire, in Scotland, ſituated about ſix miles weſt of Glaſgow, on the river White-Cart, over which there are two ſtone-bridges of two arches each, and one which conſiſts of three arches. The town is very ancient; but was of much leſs conſequence formerly than it is at preſent. The old part of it runs from eaſt to weſt upon the ſouth ſlope of a ridge of hills, from which there is a fine proſpect of the city of Glaſgow and the adjacent country; but to the ſouthward, the view terminates in a ridge of green hills, about two miles diſtant. Including the late buildings and ſuburbs, it is fully a mile long, and nearly as much in breadth. On the eaſt ſide of the river Cart, ſtand the abbey and new town; which laſt was lately feued off by the Earl of Abercorn, and already conſiſts of a number of handſome buildings. The ſtreets are here laid off in a regular manner, but (rather unfortunately for the conveniency and elegance of ſome of the houſes) not in right angles. Here the Earl of Abercorn has built, at his own expence, one of the largeſt, moſt commodious, and moſt elegant inns in Scotland. In the vicinity of this his Lordſhip is likewiſe to build ſeveral convenient and neceſſary market-places. A little way ſouth of the inn ſtands the abbey-church, the only one which Paiſley, before the year 1735, required. This church, when entire, has been a moſt noble building, and conſiſted of ſeveral diſtinct and ſeparate places of worſhip: what now remains of this magnificent Gothic ſtructure is not yet unworthy the notice of the curious in antiquities. The next church, called the *Laigh-Church*, is built in form of a Greek croſs, very well laid out, and capable of containing a great number of people. The one called the *High-Church*, is a very fine building; and as it ſtands on the top of a hill, its lofty ſpire is viſible at a great diſtance. This church is an oblong ſquare of 82 feet by 62 within the walls, built of free-ſtone well ſmoothed, having ruſtic corners and an elegant ſtone cornice at the top. In the conſtruction of the roof (which is a pavilion covered with ſlate, having a platform covered with lead on the top), there is ſomething very curious, and it is admired by every perſon of taſte. The Middle or New Church is a very neat building, on much the ſame model with the High Church, but not quite ſo large. Beſides theſe, there are alſo two Seceding Meeting-houſes and a Church of Relief. The town-houſe is a very handſome building of cut ſtone, with a tall ſpire and a clock. The fleſh-market has a genteel front of cut ſtone, and is one of the neateſt and moſt commodious of this kind in Britain. Butchers-meat, butter, cheeſe, fiſh, wool, and ſeveral other articles, are ſold here by what they call the tron-pound, of 22 Engliſh ounces and an half.

The poor-houſe is a large building, very well laid out; and ſtands oppoſite to the quay, in a fine free air. It is ſupported by a ſmall tax laid upon the inhabitants quarterly.

Cloſe by the Abbey-Church is the Earl of Abercorn's burial-place, the greateſt curioſity in Paiſley. It is a vaulted Gothic chapel, without pulpit, pew, or any other ornament, but has the fineſt *echo* perhaps in the world. When the end door (the only one it has) is ſhut, the noiſe is equal to a loud and not very diſtant clap of thunder. If you ſtrike a ſingle note of muſic, you hear the ſound gradually aſcending, with a great number of repetitions, till it dies away as if at an immenſe diſtance, and all the while diffuſing itſelf through the circumambient air. If a good voice ſings, or a muſical inſtrument is well played upon, the effect is inexpreſſibly agreeable. The *deepeſt*, as well as the moſt *acute tones*, are diſtinctly reverberated, and theſe in regular intervals of time. When a muſical inſtrument is ſounded, it has the effect of a number of inſtruments of a like ſize and kind playing in concert. When a number of different inſtruments in uniſon ſounds the ſame note, a good ear is able to diſtinguiſh the variety of ſound produced by each. A ſingle inſtrument ſounding a particular note, and then inſtantly its fifth, or any other concordant note, the two ſounds can be heard, as it were, running into and uniting with each other in a manner peculiarly agreeable. But the effect of a variety of inſtruments playing in concert, is particularly charming, and muſt excite ſuch emotions in the ſoul as it is impoſſible to deſcribe. In this chapel is the monument of Marjory Bruce; ſhe was daughter of Robert Bruce, and wife of Walter, great ſteward of Scotland, and mother of Robert II. In this ſame chapel were interred *Eliſabeth Muir* and *Euphemia Roſs*, both conſorts to Robert II. In 1160, a fine monaſtery was founded by Walter, great ſteward of Scotland; but of this there are ſcarce any veſtiges now remaining. The veſtiges of the Roman camp and *prætorium*, at the weſt end of the town, are at preſent almoſt annihilated. It was ſuppoſed to be vaulted underneath.

The inhabitants of Paiſley, in 1746, were computed at no more than 4000: but from a very accurate ſurvey which has juſt been made, the number of families in Paiſley and ſuburbs is found to be 3723; and allowing 4½ perſons to each family, the number of inhabitants will be 16,753.

Paiſley is now the firſt manufacturing town in Scotland, and is greatly celebrated on account of ſome of its branches. The manufactory of ſilk gauze, in this reſpect, firſt claims our notice. This branch is brought here to the utmoſt perfection, and is wrought to an amazing variety of patterns. It has been juſt computed, that there have been no leſs than 5000 weavers employed in Paiſley and in the country adjacent, in this branch, laſt year (1781); and the number of winders, warpers, clippers, and others neceſſary in other parts of the ſilk-manufacture, has been likewiſe computed to be no leſs than 5000. Each loom will produce in average value 70 l. yearly; the whole will then be 350,000 l.

The linen branch is likewiſe carried on here to a very conſiderable amount, particularly the manufacture of lawns; and vaſt quantities of foreign yarn are annually imported from France, Germany, &c. for this branch, beſides what is made of our home-manufactured yarn. It appears from the ſtamp-maſter's books, that from 1ſt November 1780 to 1ſt November 1781, there were ſtamped at Paiſley no leſs than 1,248,843 yards, value 105,930 l. 19 s. 10¼. The making of white ſtitching thread was introduced into this town about 50 or 60 years ago. A gentleman in this place lately diſcovered the method of making what is called *glazed white-thread*, to as great perfection as that made by Mr Leland and Son, London. The value of this branch is computed at about 60,000 l. annually. There are alſo ſeveral manufactures of a more local nature. There are three of hard-ſoap and tallow-candles, and one of black-ſoap. The candles, eſpecially the moulded ones, are reckoned the beſt and moſt elegant that have been made in Scotland; and great quantities is ſent into England, to America, and to the Weſt Indies. The annual amount of theſe laſt branches are eſtimated at nearly 20,000 l. There are alſo two or three tan-works, and a porter brewery, in town; and in the neighbourhood there is a coperas work, a callico printing work, and two works for the cotton ſpinning manufactory.

The river on which Paiſley ſtands runs from ſouth to north; and falls into Clyde, after it has joined the conflux of the rivers Grief and Black-Cart at Inchinnan bridge, about three miles below the town. At ſpring-tides, veſſels of 40 tons burthen come up to the quay. The communication by water is of great importance to the inhabitants: for in this way they are frequently ſerved with fiſh of different kinds, and can ſend their goods and manufactures to Port-Glaſgow and Greenock, and to Glaſgow likewiſe; and now, when the canal is finiſhed, they have alſo a communication with the frith of Forth.

Paiſley was created a burgh of barony in the year 1488; and the affairs of the community are managed by three bailies, of which the eldeſt is commonly in the commiſſion of the peace, a treaſurer, a town-clerk, and 17 counſellors, who are annually elected upon the firſt Monday after Michaelmas. It gives the title of baron to the earls of Abercorn; the firſt of whom was a younger ſon of the Duc de Chatellerault. The *black-book of Paiſley*, frequently mentioned in Scottiſh hiſtory, was a chronicle of the public affairs and remarkable events, kept by the monks who reſided in the monaſtery already mentioned. It agreed in every material fact with the *Scoti-chronicon* of Fordun; and is by many thought to be the ſame performance.

PAITA, a ſea-port of America, in Peru, and in the audience of Quito. The town conſiſts of about 200 houſes but one ſtory high; and the walls are made of ſplit cane and mud, and the roofs only a covering of leaves. The only defence of Paita is a fort without either ditch or out-work; but it is ſurrounded by a brick wall of little or no ſtrength, on which are mounted eight pieces of cannon. Commodore Anſon got poſſeſſion of this fort in 1741; and took and burnt the town, becauſe the governor refuſed to ranſom it. W. Long. 80. 5. S. Lat. 5. 5.

PALACE, Palatium, a name generally given to the dwelling-houſes of kings, princes, and other great perſonages; and taking different epithets, according to the quality of the inhabitants, as *imperial* palace, *royal* palace, *pontifical* palace, *cardinal* palace, *ducal* palace, *epiſcopal* palace, &c.

Palace-*Court*. See Marshalsea.

PALÆMON, or Melicertes, in fabulous hiſtory, a marine god, was the ſon of Athamas, king of Thebes and Ino. The latter, fearing the rage of the king her huſband, took Melicertes in her arms, and leaped with him into the ſea, when they were both changed into marine deities; the mother under the name *Leucothea*, ſuppoſed by ſome to be the ſame with Aurora; and her ſon under that of *Palemon*, or *Portunus*, a god who preſided over ſea-ports. Pauſanias ſays, that Melicertes was ſaved on the back of a dolphin, and his dead body thrown on the iſthmus of Corinth, where Siſyphus, his uncle, who reigned in that city, inſtituted to his honour the Iſthmian games.

Palæmon (Q. Rhemmius), a Latin grammarian, born at Vicenza, was the ſon of ſlave. He taught at Rome with great applauſe under Tiberius and Claudius, and Juvenal mentions him with praiſes. We have only ſome fragments of his works.

PALÆPAPHOS, (Strabo, Virgil, Pliny), a town of Cyprus, where ſtood a temple of Venus; and an adjoining town called *Nea Paphos;* where St Paul ſtruck Elymas blind, and converted the proconſul Sergius Paulus.

PALÆSTRA, in Grecian antiquity, a public building, where the youth exerciſed themſelves in wreſtling, running, playing at quoits, &c.

PALÆSTROPHYLAX, was the director of the palæſtra, and the exerciſes performed there.

PALAMEDIA, in ornithology, a genus belonging to the order of grallæ. The bill is conical, the ſuperior mandible being crooked; and the feet have three divided toes. There are two ſpecies, both natives of Braſil.

PALARIA, among the Romans, a kind of exerciſe performed at a ſtake by the ſoldiers. The ſtake being fixed in the ground, and ſix feet high above it, the young undiſciplined ſoldiers advanced againſt it, armed with a hurdle and cudgel, inſtead of a ſword and ſhield, and went through all the rules of attack and defence, as if actually engaged with an adverſary. Sometimes they ſtood at a diſtance, and attacked with miſſive weapons; at the ſame time uſing all the requiſite motions for defending themſelves, and warding off what might be thrown againſt them.

PALATE, in anatomy, the fleſh that compoſes the roof, or the upper and inner part, of the mouth.

The palate has much the ſame ſtructure with the gums; but it has alſo a great number of glands, diſcovered ſo early as the time of Fallopius: theſe are principally ſituated in the hinder part near the uvula, where it is pendulous, in the manner of a curtain, which part is called the *velum*, or *clauſtrum*, of the palate. The glands ſituated particularly in this part, ſecrete a mucous fluid, ſerving to lubricate the mouth and throat, and to facilitate deglutition: they have a great number of apertures there for the diſcharge of this humour into the mouth.

The great uſes of this membrane are to defend the bones of the palate from corrupting; and for preventing, by its clauſtrum or velum, the things to be ſwallowed from getting up into the noſtrils.

PALATINATE, a province or ſigniory, poſſeſſed by a palatine.

Palatinate of the Rhine, a province of Germany, divided into two parts by the Rhine, called the *Upper* and *Lower Palatinate*. The former lies in the circle of Bavaria, and belongs to the elector thereof; but the latter, in the circle we are now treating, belongs to the elector Palatine. The latter part is bounded to the eaſt by the county of Katzenellnbogen, the archbiſhopric of Mentz, the biſhopric of Worms, and part of the territory of the Tuetonic order in Franconia; to the weſt, by Alſace, the duchy of Deuxponts, the county of Sponheim, the duchy of Simmern, and certain diſtricts of the electorate of Mentz; to the ſouth, by the duchy of Wurtemberg and the biſhopric of Spire; and to the north, by a part of archbiſhopric of Mentz and the county of Katzenellnbogen. It contains 41 towns, beſides ſeveral boroughs; and its greateſt extent is about 80 miles. The air is healthful, and the ſoil fruitful in corn, paſturage, wine, tobacco, and all ſorts of pulſe and fruits, particularly walnuts, cheſnuts, and almonds. This country alſo breeds abundance of cattle, and is well watered by the Neckar, the Nahe, and the Rhine. In the laſt of theſe, near Germerſheim and Selz, is found gold; the excluſive right of ſearching for which is farmed out by the elector. The ſtate of religion hath varied greatly here ſince the Reformation, Lutheraniſm and Calviniſm having been uppermoſt by turns, till the electotate devolved to the Popiſh branches of the family, when Popery, with all its ſuperſtition and mummery, was eſtabliſhed anew: ſo that the Proteſtant religion is now on a very precarious footing in the Palatinate, though moſt of the natives are ſtill of that perſuaſion: but the two ſects of Proteſtants, namely, the Lutherans and Calviniſts, have greatly contributed to their own ruin, by their mutual jealouſy and animoſity, being no leſs rancorous againſt one another than againſt their common adverſaries the Papiſts. The Lutherans reckon themſelves 50,000 ſtrong, and are poſſeſſed of about 85 churches; but not one half of their preachers and ſchoolmaſters have a competent maintenance. The number of Calviniſt clergy here is eſtimated at 500, and that of the Roman Catholics at 400. Beſides ſchools and Jeſuits colleges in this country, there is one univerſity, namely, that of Heidelberg; but there is very little trade in it except in wine. Authors are divided about the origin of the name *Palatines*, or *Pſalzgraves*, as the Germans call them; but it ſeems moſt likely to be derived from the *palatia*, or palaces, which the old Frankiſh and German kings and Roman emperors were poſſeſſed of in different parts of the country, and over which they appointed ſupreme ſtewards or judges, who were called *Palatines* or *Pſalzgraves*. The countries where theſe Palatines kept their courts were, from them, called *Palatinates*; which name came at laſt to be appropriated, by way of eminence, to this country, as being the moſt conſiderable of them. The ancient electoral line failing in 1685, the electorate devolved to Philip-William Duke of Neuburg; and upon the death of his ſecond ſon Charles-Philip, to the prince of Sulzbach. This elector has the title of arch-treaſurer of the empire, as well as the elector of Brunſwic-Luneburgh, and is the fifth in rank among the ſecular electors. He is alſo one of the vicars of the empire alternately with the elector of Bavaria, and enjoys many other prerogatives. In his own dominions, he diſpoſes of all vacant benefices; but allows the eccleſiaſtical council, compoſed of two clergymen and two laymen, to preſent two candidates, of which he chooſes one. He is alſo maſter of all the tithes in his dominions; but he either grants them to the clergy, or ſalaries in lieu of them, out of the revenues of the church. His title is Pfalzgrave of the Rhine; archtreaſurer and elector of the holy Roman empire; duke in Bavaria, Juliers, Cleve, and Berg; prince of Mors; marquis of Bergen-op-Zoom; count of Veldens, Sponheim, the Mark, and Ravenſberg; and lord of Ravenſtein. His quota to the army of the empire is 30 horſe, and 138 foot, or 914 florins monthly. To the chamber of Wetzlar he contributes, each term, 404 rix-dollars, 82 kruitzers. There is an order of knighthood in this country, viz. that of St Hubert; the badge of which is a quadrangular croſs pendant to a red ribbon, with a ſtar on the breaſt. The whole of the elector's revenue, ariſing from the Palatinate, the duchies of Berg and Juliers, the ſeigniory of Ravenſtein, and the duchies of Neuburg and Sultzbach, hath been eſtimated at about 300,000 l. *per annum*. The military eſtabliſhment conſiſts of ſeveral regiments of horſe and foot, beſides the horſe and Swiſs life-guards. All the different courts and councils, uſual in other countries for the different departments of government, are alſo to be found here.

PALATINE, or COUNT PALATINE, a title anciently given to all perſons who had any office or employment in the prince's palace; but afterwards conferred on thoſe delegated by princes to hold courts of juſtice in the provinces; and on ſuch among the Lords as had a palace, that is, a court of juſtice, in their own houſes.

Counties-PALATINE *in England.*—Cheſter, Durham, and Lancaſter, are called *counties palatine.* The two former are ſuch by preſcription, or immemorial cuſtom; or, at leaſt as old as the Norman conqueſt: the latter was created by king Edward III. in favour of Henry Plantagenet, firſt earl and then duke of Lancaſter; whoſe heireſs being married to John of Gaunt the king's ſon, the franchiſe was greatly greatly enlarged and confirmed in parliament, to honour John of Gaunt himſelf, whom, on the death of his father-in-law, the king had alſo created duke of Lancaſter. Counties-palatine are ſo called *à palatio;* becauſe the owners thereof, the earl of Cheſter, the biſhop of Durham, and the duke of Lancaſter, had in thoſe counties *jura regalia*, as fully as the king hath in his palace; *regalem poteſtatem in omnibus*, as Bracton expreſſes it. They might pardon treaſons, murders, and felonies; they appointed all judges and juſtices of the peace; all writs and indictments ran in their names, as in other counties in the king's; and all offences were ſaid to be done againſt their peace, and not, as in other places, *contra pacem domini regis*. And indeed by the ancient law, in all peculiar juriſdictions, offences were ſaid to be done againſt his peace in whoſe court they were tried; in a court-leet, *contra pacem domini;* in the court of a corporation, *contra pacem ballivorum;* in the ſheriff's court or tourn, *contra pacem vicecomitis*. Theſe palatine privileges (ſo ſimilar to the regal independent juriſdictions uſurped by the great barons on the continent during the weak and infant ſtate of the firſt feodal kingdoms in Europe), were in all probability originally granted to the counties of Cheſter and Durham, becauſe they bordered upon enemies countries, Wales and Scotland: in order that the owners, being encouraged by ſo large an authority, might be the more watchful in its defence; and that the inhabitants, having juſtice adminiſtered at home, might not be obliged to go out of the county, and leave it open to the enemy's incurſions. And upon this account alſo there were formerly two other counties palatine, Pembrokeſhire and Hexhamſhire, the latter now united with Northumberland: but theſe were aboliſhed by parliament, the former in 27 Hen. VIII. the latter in 14 Eliz. And in 27 Hen. VIII. likewiſe, the powers before mentioned of owners of counties-palatine were abridged; the reaſon for their continuance in a manner ceaſing: though ſtill all writs are witneſſed in their names, and all forfeitures for treaſon by the common law accrue to them.

Of theſe three, the county of Durham is now the only one remaining in the hands of a ſubject. For the earldom of Cheſter, as Camden teſtifies, was united to the crown by Hen. III. and has ever ſince given title to the king's eldeſt ſon. And the county palatine, or duchy, of Lancaſter was the property of Henry of Bolingbroke, the ſon of John of Gaunt, at the time when he wreſted the crown from king Richard II. and aſſumed the title of Hen. IV. But he was too prudent to ſuffer this to be united to the crown; leſt, if he loſt one, he ſhould loſe the other alſo. For, as Plowden and Sir Edward Coke obſerve, "he knew he had the duchy of Lancaſter by ſure and indefeaſible title, but that his title to the crown was not ſo aſſured: for that after the deceaſe of Richard II. the right of the crown was in the heir of Lionel duke of Clarence, ſecond ſon of Edward III.; John of Gaunt, father to this Henry IV. being but the fourth ſon." And therefore he procured an act of parliament, in the firſt year of his reign, ordaining that the duchy of Lancaſter, and all other his hereditary eſtates, with all their royalties and franchiſes, ſhould remain to him and his heirs for ever; and ſhould remain, deſcend, be adminiſtered, and governed, in like manner as if he never had attained the regal dignity: and thus they deſcended to his ſon and grandſon, Henry V. and Henry VI.; many new territories and privileges being annexed to the duchy by the former. Henry VI. being attainted in 1 Edward IV. this duchy was declared in parliament to have become foreited to the crown, and at the ſame time an act was made to incorporate the duchy of Lancaſter, to continue the county palatine (which might otherwiſe have determined by the attainder), and to make the ſame parcel of the duchy: and, farther, to veſt the whole in king Edward IV. and his heirs, kings of England, for ever; but under a ſeparate guiding and governance from the other inheritances of the crown. And in 1 Hen. VII. another act was made, to reſume ſuch part of the duchy lands as had been diſmembered from it in the reign of Edward IV. and to veſt the inheritance of the whole in the king and his heirs for ever, as amply and largely, and in like manner, form, and condition, ſeparate from the crown of England

land and poſſeſſion of the ſame, as the three Henries and Edward IV. or any of them, had and held the ſame.

The iſle of Ely is not a county-palatine, though ſometimes erroneouſly called ſo, but only a royal franchiſe: the biſhop having, by grant of king Henry the firſt, *jura regalia* within the iſle of Ely; whereby he exerciſes a juriſdiction over all cauſes, as well criminal as civil.

PALATINE *Games*, in Roman antiquity, games inſtituted in honour of Auguſtus by his wife Livia, after he had been enrolled among the gods. They were celebrated in the palace, and were confirmed by the ſucceeding emperors.

PALATINUS MONS, or *Palatium*, the firſt mountain of Rome occupied by Romulus, and where he fixed his reſidence and kept his court, as did Tullus Hoſtilius, Auguſtus, and all the ſucceeding emperors: and hence it is that the reſidence of princes is called *palatium*. The reaſon of the name is variouſly aſſigned. To the eaſt it has the Mons Cœlius, to the ſouth the Aventine, to the weſt the Capitoline, and to the north the Forum.—*Palatinus*, the ſurname of Apollo from this place; where Auguſtus built a temple to that god, adorned with porticos and a library, (Horace).

PALATIUM, (anc. geog.) a place in the territory of Reate, diſtant from it 25 ſtadia. Dionyſius Halicarnaſſeus reckons it one of the firſt towns of the Aborigines, and from it Varro accounts for the name of the *Mons Palatinus*; namely, that a colony from Palatium ſettled there.

PALATIUM (Pliny), *Pallantium* (Pauſanias), *Palanteum* (Livy); *Pallanteum* (Solinus). This laſt is the true writing; the great grandfather of Evander, from whom it took its name, being called *Pallas*, not *Palas*: A town of Arcadia, which concurred to form Megalopolis (Pauſanias). From it the *Palatium*, or *Mons Palatinus*, takes alſo its name, according to Virgil and Pliny.

PALATIUM *Diocleſiani*; the villa of Diocleſian, near Salonæ, where he died, (Euſebius). Afterwards called *Spalatum*; which roſe to a conſiderable city from the ruins of Salonæ; ſituate in Dalmatia on the Adriatic. Now *Spalatto*, or *Spaletro*.

PALATIUM *Luculli*, (Plutarch), or *Villa Luculli*; a place between Miſenum and Baiæ in Campania, of wonderful ſtructure. Now in ruins, and called *Piſcina Mirabile*.

PALATO-SALPINGÆUS, } See ANATOMY, *Table*
PALATO-*Staphylinus*, } *of the Muſcles*.

PALE, a little pointed ſtake or piece of wood uſed in making incloſures, ſeparations, &c. The *pale* was an inſtrument of puniſhment and execution among the ancient Romans, and ſtill continues ſo among the Turks. Hence empaling, the paſſing a ſharp pale up the fundament through the body.

PALE, in heraldry. See HERALDRY, p. 4839.

PALEARIUS (Aonius), was a man of the greateſt probity, and one of the beſt writers of the 16th century. He gained the eſteem of the men of wit and learning of his time by a noble poem on the immortality of the ſoul. He was appointed profeſſor of polite literature at Sienna; where his tranquillity was diſturbed by conteſts with an envious colleague, and by the malicious aſperſions of his enemies; againſt which, however, his eloquence proved always a ſufficient defence. At laſt he left Sienna, and accepted the invitation of the magiſtrates of Lucca, who gave him ſeveral marks of their eſteem, and ſettled a conſiderable ſtipend upon him. Some years after, he removed to Milan; where he was ſeized by order of Pope Pius V. and carried to Rome. He was convicted of having ſpoken in favour of the Lutherans, and againſt the inquiſition; and therefore was condemned to be burnt. This ſentence was executed in 1566. He wrote ſeveral pieces in verſe and proſe; of which the one abovementioned is the moſt eſteemed.

PALENCIA, a town of Spain, in the kingdom of Leon, with a rich archbiſhop's ſee. It had an univerſity, but it was removed to Salamanca. It is ſeated in a fertile ſoil on the river Carion on the frontiers of Caſtile, in W. Long. 3. 7. N. Lat. 42. 10.

PALERMO, an ancient, large, populous, rich, and handſome city of Sicily in the Val-di-mazara, with an archbiſhop's ſee and a harbour. It was the ſeat of the ancient kings, and is four miles in circumference. It is a place of great trade; the houſes are handſome and ſuperb; it is alſo well fortified, and very populous. The public buildings, ſquares, churches, and fountains, are extremely fine. The fountain in the great ſquare is thought to be the fineſt in all Italy. The number of the inhabitants is above 200,000; and the harbour is very large, having a mole 1300 geometrical paces in length; but the veſſels that ride therein are not always very ſafe. There is a magnificent caſtle built near the ſea-ſide, wherein the viceroy reſides ſix months in the year; and his preſence draws a great number of nobility to this place. This city has ſuffered greatly by earthquakes, particularly in 1693; and it was greatly damaged by a fire in 1730, when a magazine of powder was blown up, containing 400 tons. It ſtands in a pleaſant fruitful country on the north-eaſt coaſt of the iſland, and at the bottom of the gulph of the ſame name. E. Lon. 33. 40. N. Lat. 38. 10.

PALES, in Pagan worſhip, the goddeſs of the ſhepherds; to whom they offered milk and honey, in order that ſhe might deliver them and their flocks from wild beaſts and infectious diſeaſes. This goddeſs is repreſented as an old woman.

PALESTINE, a part of Aſiatic Turky, ſituated between 36 and 38 degrees of E. Long. and between 31 and 34 of N. Lat. It is bounded by Mount Libanus, which divides it from Syria, on the north; by Mount Hermon, which ſeparates it from Arabia Deſerta, on the eaſt; by the mountains of Seir and the deſarts of Arabia Petræa, on the ſouth; and by the Mediterranean Sea on the weſt.

This once fertile and happy ſpot was firſt called the land of *Canaan*, or *Chanaan*, from Noah's grandſon. In ſcripture, however, it is frequently diſtinguiſhed by other names; ſuch as the *land of promiſe*, the *land of God*, the *land of Iſrael*, &c. It received the name of *Paleſtine* from the *Paleſtines*, or *Philiſtines*, who poſſeſſed a great part of it; and it had the name of *Judæa*, or *Judæa-Paleſtina*, from *Judah*, the moſt conſiderable of the twelve ſons of Jacob. The Chriſtians have denominated it the *Holy Land*; partly on account of the many ſingular bleſſings it received from the divine

vine providence, and partly on account of its metropolis being made the centre of God's worſhip and his peculiar habitation; but much more for its being the place of our Saviour's birth, the ſcene of hispreaching, and manifold miracles; eſpecially the place in which he accompliſhed the great work of our redemption. As to the name of *Judæa*, it did not begin to receive that till after the return of the Jews from the Babyloniſh captivity, though it had been ſtyled long before the *kingdom of Judah*, in oppoſition to that of *Iſrael*, which revolted from it under Jeroboam, in the reign of Rehoboam the ſon of Solomon. But after the return, the tribe of Judah, the only one that made any figure, ſettling at Jeruſalem, and in the countries adjacent, quickly gave its name to the whole territory. By profane authors it was called by many different names; ſuch as Syria, Paleſtina Syria, Cæleſyria, Iduma, Idumæa, and Phœnicia or Phœnice; but theſe are ſuppoſed only to have been given out of contempt to the Jewiſh nation, whom they looked upon as unworthy of any other name than what diſtinguiſhed the moſt obſcure parts of the neighbouring provinces.

That part of the country which was properly called the *Land of Promiſe*, was incloſed on the weſt by the Mediterranean; on the eaſt by the lake Aſphaltites, the Jordan, and the ſea of Tiberias or of Galilee, and the Samachonite lake; to the north it had the mountains of Libanus, or rather of Antilibanus, or the province of Phœnicia; and to the ſouth, that of Edom or Idumea, from which it was likewiſe parted by another ridge of high mountains. The boundaries of the other part, which belonged to the two tribes and an half beyond the river Jordan, are not ſo eaſily defined, as well as thoſe of the conqueſts made by the more proſperous kings of the Jews. All that can be ſaid with any probability is, that the river Arnon was the firſt northern boundary on that ſide; and with reſpect to thoſe on this ſide the Jordan, there is a conſiderable diſagreement between the Hebrew and Samaritan verſions of the Pentateuch.

The extent of this country is likewiſe variouſly ſettled by geographers; ſome giving it no more than 170 or 180 miles from north to ſouth, and 140 in breadth where broadeſt, though not much above half that breadth where narroweſt. But from the lateſt and moſt accurate maps, it appears to extend near 200 miles in length, and about 80 in breadth about the middle, and about 10 or 15 more or leſs, where it widens or ſhrinks. It reaches from 31. 30. to 33. 30. N. Lat. and from 34. 50. to 37. 15. E. Long. the longeſt day being about 14 hours 15 minutes.

Theſe limits are ſo ſmall, conſidering that the country is likewiſe interſected by high ridges or mountains, woods, deſerts, &c. that many learned men have been induced to queſtion what we read of its fertility and populouſneſs in former times. It muſt be owned, indeed, that when we compare its ancient and flouriſhing ſtate, when it was cultivated with the utmoſt diligence by perſons well ſkilled in every branch of agriculture, with what it hath been ſince the total extirpation of the Jews out of it, and more eſpecially ſince it fell into the hands of the Turks, the contraſt is amazingly great: but when we conſider the many evident cauſes which have contributed to effect this change, and even yet conſider the nature of the country itſelf, we find not the leaſt reaſon to doubt the truth of what the ſacred hiſtorians have related. Moſes deſcribes the richneſs of it in the ſtrongeſt terms, even before the Iſraelites got poſſeſſion of it. It even exceeded the land of Egypt, ſo much celebrated by ancient hiſtorians; eſpecially in the vaſt numbers of cattle which it produced; in the quantity and excellence of its wine, oil, and fruits. With reſpect to the oil and fruits, it is plain, that the olives and oil of Canaan exceeded in goodneſs thoſe of Egypt, ſince the tribes ſent them thither from thence; and as for vines, Herodotus tells us, that the Egyptians had none at all, but ſupplied the want of them by a liquor brewed from barley. The preſents which Jacob ſent to his ſon Joſeph, of honey, ſpices, myrrh, almonds, and other fruits of Paleſtine, ſhew that they muſt have been much better in the land of Judea than in Egypt. The wines of Gaza, Aſcalon, and Sarepta, were famous among the moſt remote nations; though it is allowed, that the wine which was made at and in the neighbourhood of Bethlehem, in great quantities, was equal at leaſt, if not ſuperior, to any of the reſt: and that of Libanus, mentioned by the prophet Hoſea, was no leſs celebrated for its excellent flavour.

Several circumſtances contributed to this wonderful fecundity: ſuch as, the excellent temperature of the air, which was never ſubject to exceſſive heats or colds; the regularity of its ſeaſons, eſpecially the former and latter rain; and the natural fatneſs and fertility of its ſoil, which required neither dunging nor manuring, and could be ploughed with a ſingle yoke of oxen and a ſmall kind of plough; for the ſoil was, and is ſtill, ſo ſhallow, that to have gone deep into it, would rather endanger, than improve, the crop. With reſpect to the excellency of its corn, we are told, that the bread of Jeruſalem was preferred above all other; and the tribe of Aſher produced the beſt of both, and in greater quantity than any other tribe: and ſuch plenty was there of it, that, beſides what ſufficed the inhabitants, who made it their chief ſuſtenance, Solomon, we read, could afford to ſend 20,000 cors, or meaſures, of it, and as many of oil, yearly, to Hiram king of Tyre; beſides what they exported into other countries. And we find, even ſo late as king Herod ſurnamed Agrippa, the countries of Tyre and Sidon received moſt of their ſuſtenance from his tetrarchy.

As to their fruits, the grapes were delicious, finely flavoured, and very large. The palm tree and its dates were in no leſs requeſt; and the plain of Jericho, among other places, was famed for the great plenty and excellence of that fruit; inſomuch, that the metropolis of that territory was emphatically ſtyled *the city of palm-trees*. But what both this plain, and other parts of Paleſtine, were moſt celebrated for, was, the balſam ſhrub, whoſe balm was eſteemed ſo precious a drug among the Greeks, Romans, Egyptians, and other nations, and is ſtill to this day under the name of *balm of Gilead*. They had likewiſe the greateſt variety of other fruit-trees in the higheſt perfection; and which might be, in ſome ſenſe, ſtyled *perpetual*, becauſe they were not only covered with a conſtant verdure, but becauſe the new buds always appeared on the ſame boughs before the old fruit was ripe; and of thoſe buds, which were in too great quantities to be allowed to come to maturity, they gathered enough to make very delightful pickles and ſweatmeats, eſpecially of their citrons, oranges, and apples of paradiſe, which laſt commonly hung by hundreds in a cluſter, and as big as hens eggs, and of an excellent taſte and flavour. Their vines yielded grapes twice, and ſometimes three times, a-year, great quantities of which were dried up, and preſerved for uſe, as well as their figs, plums, and other fruits. They had plenty of honey; the very trees diſtilled it; and the rocks yielded it in great quantities: but whether that of the latter kind were there depoſited by the induſtrious bees, or produced ſome other way, is much diſputed by travellers and naturaliſts. They likewiſe cultivated ſugar-canes in great abundance; and the cotton, hemp, and flax, were moſtly of their own growth and manufacture, except ſome of a finer ſort, that were brought to them from Egypt, and worn by thoſe of the higher rank. Their vicinity to Libanus made the cedars, cypreſſes, and other ſtately fragrant trees, very common in moſt parts of the land, but more eſpecially in Jeruſalem. Cattle, both large and ſmall, they fed in vaſt quantities; and the hilly countries not only afforded them variety and plenty of paſture, but alſo of water, which deſcended thence into the valleys and lowlands, and fertilized them to the degree we have ſeen; beſides ſeveral other rivers and brooks, ſome of the moſt remarkable of which we ſhall ſpeak of in their proper places. But the moſt fertile paſture-grounds were thoſe on each ſide the river Jordan; beſides thoſe of Sharon, or Sarona, the plains of Lydda, Jamnia, and ſome others then juſtly famed for their fecundity. As for fiſh, the rivers above-mentioned, the lake of Tiberias, and the Mediterranean Sea, afforded, as they do to this day, great plenty and variety. Vaſt quantities were brought to Jeruſalem, on which the inhabitants moſtly ſubſiſted; and hence one of the gates of that metropolis was, according to St Jerome, called *the fiſh-gate.* The lake Aſphaltites yielded ſalt in abundance, wherewith to ſeaſon and preſerve their fiſh, which Galen affirms to have been preferable to any other for wholeſomeneſs, digeſtion, and extenuation. In ſhort, the Scripture is ſo pregnant with proofs of the extraordinary richneſs and fecundity of this once happy land, and the vaſt number of people that lived in it, almoſt wholly upon its product, to ſay nothing of the vaſt exports of its corn, wine, oil, raiſins, and other fruits, &c. that a man muſt have taken a ſtrange warp to infidelity, that can call it in queſtion, merely on account of the melancholy and quite oppoſite figure it now makes under its preſent tyrannical government.

But it ought to be conſidered, that it was then inhabited by an induſtrious people, who knew how to improve every inch of their land, and had made even the moſt deſart and barren places to yield ſome kind of productions, by proper care and manure: ſo that the very rocks, which now appear quite bare and naked, were made to produce corn, pulſe, or paſture; being, by the induſtry of the old inhabitants, covered with mould, which, through the lazineſs of the ſucceeding proprietors, has been ſince waſhed off with rains and ſtorms. We may add, that the kings themſelves were not above encouraging all kind of agriculture, both by precept and example; and, above all, that they had the divine bleſſing promiſed to their honeſt endeavours and induſtry: whereas it is now, and hath been long ſince, inhabited by a poor, lazy, indolent people, groaning under an intolerable ſervitude and all manner of diſcouragements; by which their averſion to labour and agriculture, farther than what barely ſerves to ſupply their preſent wants, is become, in a manner, natural and invincible. We may farther obſerve, after the judicious Mr Maundrell, that there is no forming an idea of its ancient flouriſhing ſtate, when under the influence of heaven, from what it is now under a viſible curſe. And, if we had not ſeveral concurring teſtimonies from profane authors, who have extolled the fecundity of Paleſtine, that ſingle one of Julian the apoſtate, a ſworn enemy to Jews and Chriſtians, as well as to all the ſacred writings, would be more than ſufficient to prove it; who frequently makes mention, in his epiſtles, of the perpetuity, as well as excellence and great abundance, of its fruits and product. The viſible effects of God's anger, which this country has felt, not only under Titus Veſpaſian (when myriads of inhabitants were either ſlain, or periſhed by the moſt ſevere famine, peſtilence, and other calamities; and the reſt ſold for ſlaves, into all lands; and new colonies ſent to re-people it; who found it in ſuch a deſolate ſtate, as quite diſcouraged them from reſtoring it to its priſtine fruitfulneſs); but much more ſince that emperor's time, in the inundations of the northern barbarians, of the Saracens, and of the more cruel and deſtructive Chriſtians during the holy war; and in the oppreſſion it now feels under the Turkiſh yoke; may be eaſily owned to be more than ſufficient to have wrought the diſmal change we are ſpeaking of, and to have reduced the far greater part into a mere deſart.

Nevertheleſs, if we may credit thoſe who have viewed it in this doleful condition, they will tell us, there are ſtill ſuch viſible ſigns of its natural richneſs and fertility, as plainly ſhew, that the bare want of culture is the main, if not the only cauſe of its preſent poverty and barrenneſs. We ſhall hint, as a further proof of this, what a learned traveller hath lately written of it from his own obſervations.

"The Holy Land," ſays Dr Shaw, "were it as well peopled and cultivated as in former times, would ſtill be more fruitful than the very beſt part of the coaſt of Syria and Phœnice; for the ſoil is generally much richer, and, all things conſidered, yields a more preferable crop. Thus the cotton that is gathered in the plains of Ramah, Eſdraelon, and Zabulun, is in greater eſteem than what is cultivated near Sidon and Tripoli. Neither is it poſſible for pulſe, wheat, or any ſort of grain, to be more excellent than what is ſold at Jeruſalem. The barrenneſs, or ſcarcity rather, which ſome authors may, either ignorantly or maliciouſly, complain of, doth not proceed from the incapacity or natural unfruitfulneſs of the country, but from the want of inhabitants, and the great averſion there is to labour and induſtry in thoſe few who poſſeſs it. There are, beſides, ſuch perpetual diſcords and depredations among the petty princes who ſhare this fine country, that, allowing it was better peopled, yet there would be ſmall encouragement to ſow, when it was uncertain who ſhould gather in the harveſt. Otherwiſe, the land is a good land, and ſtill capable of affording its neighbours the like ſupplies of corn and oil which it is known to have done in the time of Solomon."

PALESTRINA, a town of Italy, in the Campagna di Roma, with a biſhop's ſee. It is the capital of a princpality of the ſame name, and the biſhop is one of the ſix cardinals. It was anciently famous for the temple of Fortune, being then called *Præneſte*, and ſeated on the top of a mountain, the ruins of which may yet be ſeen. E. Long. 12. 55. N. Lat. 41. 51.

PALESTRINA, is one of the largeſt and moſt populous of the iſlands called the *Lagunes*, near Venice, and where the moſt conſiderable of the noblemen have houſes of pleaſure. It is 15,000 paces in length, and 400 in breadth; the principal harbour has alſo the ſame name.

PALFIN (John), an eminent ſurgeon, anatomiſt, and reader in ſurgery at Ghent, the place of his birth; acquired great reputation by his learning and works. The principal of theſe are, 1. A treatiſe on Oſteology, in 12mo, Paris 1731. 2. Anatomy of the human body, in 2 vols 8vo, Paris 1734. He died at Ghent at a great age, in 1730.

PALFREY, is one of the better ſort of horſes uſed by noblemen or others for ſtate; and ſometimes of old taken for a horſe fit for a woman to ride. Camden ſays, that William Fauconberge held the manor of Cukeny, in the county of Nottingham, in ſergeantry, by the ſervice of ſhoeing the king's palfrey when the king ſhould come to Mansfield.

PALICATE, a ſea-port town of India, on this ſide of the Ganges. It is ſeated on the coaſt of Coromandel, in the kingdom of Carnate, 70 miles north of Fort St George. Here the dutch have a factory, and fort called the *Fort of Guelderland*. E. Long. 80. 1. N. Lat. 13. 34.

PALINURI PROMONTORIUM, (Virgil, Velleius,) with a cognominal port, was ſituated at the ſouth extremity of the Sinus Pæſtanus, on the coaſt of Lucania; ſo called from Palinurus, Æneas's ſteerſman, who there periſhed. (Mela, Dionyſius Halicarnaſſæus.)

PALINDROMUS, a verſe or ſentence which runs the ſame when read either backwarks or forwards. Such is the verſe,

Roma tibi ſubito motibus ibit amor.

Some people of leiſure have refined upon the Palindromus, and compoſed verſes, each word of which is the ſame backwards as forwards; for inſtance, that of Camden:

Odo tenet mulum, madidam mappam tenet Anna.
Anna tenet mappam madidam, mulum tenet Odo.

PALINGENESIA, among divines, the ſame with regeneration. Among chemiſts, it denotes the producing of a body from its principles.

PALINGENIUS (Marcellus), well known by a poem divided into 12 books, and intitled *Zodiacus Vitæ*, which he was ſeveral years of compoſing, and dedicated to Hercules II. of Eſte, duke of Ferrara. Some ſay he was phyſician to the prince: others rank him among the learned Lutherans to whom the ducheſs of Ferrara gave a reception in her court and honoured with her protection. His *Zodiac* contains good things, and is a philoſophical ſatire againſt immorality and falſe prejudices. Though this poem has borne a multitude of impreſſions, the author's life is but little known. He died ſome time between the years 1537 and 1543.

PALINODY, a diſcourſe contrary to a preceding one: hence the phraſe of *palinodiam canere* was taken for a recantation.

PALISADES, in fortification, ſtakes made of ſtrong ſplit wood, about nine feet long, ſix or ſeven inches ſquare, three feet deep in the ground, in rows about two and an half or three inches aſunder, placed in the covert way, at three feet from, and parallel to, the parapet or ſide of the glacies, to ſecure it from ſurpriſe. They are alſo uſed to fortify the avenues of open forts, gorges, half-moons, the bottoms of ditches, and in general all poſts liable to ſurpriſe. They are uſually fixed perpendicularly, though ſome make an angle inclining towards the ground next the enemy, that the ropes caſt over them to tear them up may ſlip off.

Turning **PALISADES**; an invention of Mr Coehorn, in order to preſerve the paliſades of the covert way from the beſiegers ſhot. They are ſo ordered, that as many of them as ſtand in the length of a rod, or about ten feet, turn up and down like traps, ſo as not to be in ſight of the enemy till they juſt bring on their attack; and yet are always ready to do the proper ſervice of paliſades.

PALISSE, in heraldry, a bearing like a range of paliſades before a fortification, repreſented on a feſſe, riſing up a conſiderable height, and pointed a-top, with the field appearing between them.

PALIURUS, in botany. See RHAMNUS.

PALL, in heraldry, a figure like a Greek Υ, about the breadth of a pallet; it is by ſome heralds called a *croſs-pall*, on account of its being looked upon as an archiepiſcopal bearing.

PALLA, in Roman antiquity, a mantle which women wore over the gown called *ſtola*. It was borne on the left ſhoulder; whence paſſing to the other ſide, under the right arm, the two ends were bound under the left arm, leaving the breaſt and arm quite bare.

PALLADIO (Andrea), a celebrated Italian architect of the 16th century, was a native of Vicenza in Lombardy, and the diſciple of Triffin. He made exact drawings of the principal works of antiquity to be met with at Rome, adding commentaries to them, which went through ſeveral impreſſions. But this, though a very uſeful work, was greatly exceeded by the Treatiſe of Architecture in four books, which he publiſhed in 1570. Inigo Jones wrote ſome excellent remarks on it; which were included in an edition of Palladio, publiſhed by Leoni, in 2 vols folio, 1742.

PALLADIUM, in antiquity, a ſtatue of the goddeſs Pallas, ſuppoſed to have dropped down from heaven, preſerved in Troy, whereon the fate of that city is ſaid to have depended. It is ſaid that there was anciently a ſtatue of Pallas preſerved at Rome, in the temple of Veſta, which ſome pretended to be the true palladium of Troy, brought into Italy by Æneas: it was kept among the ſacred things of the temple, and only known to the prieſts and veſtals. It was eſteemed the deſtiny of Rome; and there were ſeveral others made perfectly like it to ſecure it from being ſtolen, as was that at Troy, which the oracle of Apollo declared ſhould never be taken ſo long as the palladium was found within its walls: this occaſioned Diomede and Ulyſſes, in the time of the Trojan war, to undertake the ſtealing of it.

PALLET, among painters, a little oval table, or piece of wood, or ivory, very thin and ſmooth; on and round which, the painters place the ſeveral colours they have occaſion for, to be ready for the pencil. The middle ſerves to mix the colours on, and to make the tints required in the work. It has no handle, but, inſtead thereof, a hole at one end to put the thumb through to hold it.

Pallet, among potters, crucible-makers, &c. a wooden inſtrument, almoſt the only one they uſe, for forming, heating, and rounding their works. They have ſeveral kinds: the largeſt are oval, with a handle; others are round, or hollowed triangularly; others, in fine, are in manner of large knives, ſerving to cut off whatever is ſuperfluous on the moulds of their work.

Pallet, in gilding, an inſtrument made of a ſquirrel's tail, to take up the gold leaves from the pillow, and to apply and extend them on the matter to be gilt. See Gilding.

Pallet, in heraldry, is nothing but a ſmall pale, conſiſting of one half of it in breadth, and therefore there are ſometimes ſeveral of them upon one ſhield.

Pallet, is alſo a part belonging to the balance of a watch or movement. See the article Watch.

PALLIATION, or a Palliative *Cure*, in medicine, is when, in deſperate and incurable diſeaſes, after predicting the fatal event, the phyſician preſcribes ſome remedies for mitigating the pain or ſome other urgent ſymptoms, as in ulcerated cancers, or cancerous fiſtulas, and the like.

PALLIUM, a word often mentioned in our old hiſtorians. Durandus tells us, that it is a garment made of white wool, after the following manner, viz. The nuns of St Agnes, every year, on the feaſt-day of their ſaint, offer two white lambs on the altar of their church, during the time they ſing *Agnus Dei*, in a ſolemn maſs; which lambs are afterwards taken by two of the canons of the Lateran church, and by them given to the Pope's ſubdeacons, who ſend them to paſture till ſhearing time, and then they are ſhorn, and the pall is made of their wool mixed with other white wool. The pall being thus made, is carried to the Lateran church, and there placed on the high altar, by the deacons of that church, on the bodies of St Peter and St Paul; and after an uſual watching, it is carried away in the night, and delivered to the ſubdeacons, who lay it up ſafe. And becauſe it was taken from the body of St Peter, it ſignifies the plenitude of eccleſiaſtical power: and therefore it was the prerogative of popes, who pretend to be the immediate ſucceſſors of that ſaint, to inveſt other prelates with it; which at firſt was done nowhere but at Rome, tho' afterwards at other places.

PALM-sunday, in the Chriſtian church, the ſunday next before Eaſter; being ſo called in memory of our Saviour's triumphal entry into Jeruſalem, when the multitude that attended him ſtrewed branches on his way.

Palm-*Tree*, in botany. See Phoenix.

Palma, or Palma *Nova*, a very ſtrong town of Italy, in the territory of Venice, and in Friuli. It is a very important place, for the defence of the Venetians againſt the Auſtrians and Turks; and was built in 1593, for that very purpoſe. They have cut a canal near this place, which is very advantageous. It is ſeated on the the ſea-ſide, 10 miles ſouth-eaſt of Udino, and 55 north-eaſt of Venice. E. Long. 13. 25. N. Lat. 46. 2.

Palma, an iſland in the Atlantic Ocean, and one of the Canaries, 36 miles north-weſt of Gomera, and about 75 in circumference. It abounds in wine and ſugar; and has a handſome town of the ſame name, which carries on a trade in wine to the Weſt Indies and other parts. Their beſt vines grow in a ſoil called the *Brenia*, where they make 12,000 butts of wine every year, which is well known by the name of *palm-wine*. There is plenty of cattle, and all ſorts of fruits. In 1625 a volcano broke out in this iſland, with a moſt violent earthquake; the flame was ſeen for ſix weeks together, and a great quantity of aſhes were thrown as far as Teneriff. It was conquered by the Spainards in 1460.

PALMARIS muscle, in anatomy. See there, *Table of the muſcles*.

PALMATED, ſomething reſembling the ſhape of the hand: thus we ſay, palmated leaves, roots, ſtones, &c.

PALMIPEDES, among ornithologiſts, the ſame with web-footed birds. See Ornithology.

PALMISTRY, a kind of divination, or rather a deceitful art practiſed by gypſies, who pretend to foretell events by looking upon the lines and marks of the hand.

PALMYRA, or Tadmor, a noble city of ancient Syria, now in ruins, the origin of whoſe name is uncertain. Neither is it well known by whom this city was built; for though, from the identity of the names, it is thought by many to have been the *Tadmor in the wilderneſs* built by Solomon, this point is much controverted by many learned men. Nor have we any authentic hiſtory of it till after the captivity of the Roman emperor, Valerian, by the Perſians. At that time it was become an opulent city, to which its ſituation in the vicinity of the Roman and Parthian empires greatly contributed; as the caravans, in going to or returning from the Eaſt, frequented the place, and thus rendered it a conſiderable ſeat of merchandiſe. It enjoyed an independency till the time of Trajan; who, having made himſelf maſter of almoſt all the Parthian empire, reduced Palmyra likewiſe, and it was afterwards accounted part of the Roman dominions. But when the defeat and captivity of Valerian had ſo much weakened the empire, that the Perſians ſeemed to be in a fair way of becoming maſters of all the eaſtern provinces, the Palmyrenians began to entertain thoughts of recovering their liberty. Odenathus, prince of Palmyra, ſent a very reſpectful letter to Sapor on his return, accompanied with conſiderable preſents; but by that haughty conqueror his letter and embaſſy were treated with the moſt provoking contempt. The preſents were thrown into the Euphrates: and to his letter Sapor replied, That his inſolence in preſuming to write to his lord was inexcuſable; but if he could atone for it in any way, it would be by preſenting himſelf before the throne bound hand and foot, in token of a conſciouſneſs of his crime, and the puniſhment he deſerved. With this injurious treatment Odenathus was ſo provoked, that he ſwore either to bring down the pride of the haughty conqueror, or die in the attempt. Accordingly, having aſſembled what forces he could, he fell upon the Perſians, deſtroyed a number of them, took a great part of their baggage, and ſome of the king's concubines. Of the war of Odenathus with the Perſians, however, we know very little: only that though the latter were often vanquiſhed, and the independency of Palmyra eſtabliſhed for the preſent; yet Valerian was never releaſed from his captivity, tho' Odenathus earneſtly wiſhed to have the honour of reſcuing him from his enemies.

Odenathus enjoyed his ſovereignty but a very ſhort time; being murdered by his nephew, who was ſoon after put to death by Zenobia the wife of Odenathus. This lady is ſaid to have been poſſeſſed of very extraordinary endowments both of body and mind, being, according to Mr Gibbon, almoſt the only Aſiatic woman who is recorded to have overcome the obſtacles ariſing from the confined ſituation of the fair ſex in that part of the world. Immediately on taking vengeance for the murder of her huſband, ſhe aſſumed the government, and ſoon ſtrengthened herſelf ſo much, that ſhe reſolved to ſubmit neither to the Roman nor Perſian power. The neighbouring ſtates of Arabia, Armenia, and Perſia, dreaded her enmity, and ſolicited her alliance. To the dominions of Odenathus, which extended from the Euphrates to the frontiers of Bithynia, his widow added the inheritance of her anceſtors, the populous and fertile kingdom of Egypt. The emperor Claudius acknowledged her merit, and was content, that, while he purſued the Gothic war, ſhe ſhould aſſert the dignity of the empire in the eaſt. The conduct, however, of Zenobia, was attended with ſome ambiguity; nor is it unlikely that ſhe had conceived the deſign of erecting an independent and hoſtile monarchy. She blended with the popular manners of Roman princes the ſtately pomp of the courts of Aſia, and exacted from her ſubjects the ſame adoration that was paid to the ſucceſſors of Cyrus. She beſtowed on her three ſons a Latin education, and often ſhewed them to the troops adorned with the imperial purple. For herſelf ſhe reſerved the diadem, with the ſplendid but doubtful title of *Queen of the Eaſt*.

When Aurelian paſſed over into Aſia, againſt an adverſary whoſe ſex alone could render her an object of contempt, his preſence reſtored obedience to the province of Bithynia, already ſhaken by the arms and intrigues of Zenobia. Advancing at the head of his legions, he accepted the ſubmiſſion of Ancyra; and was admitted into Tyana, after an obſtinate ſiege, by the help of a perfidious citizen. The generous, tho' fierce temper of Aurelian, abandoned the traitor to the rage of the ſoldiers: a ſuperſtitious reverence induced him to treat with lenity the countrymen of Apollonius the philoſopher. Antioch was deſerted on his approach; till the emperor, by his ſalutary edicts, recalled the fugitives, and granted a general pardon to all who, from neceſſity rather than choice, had been engaged in the ſervice of the Palmyrenian queen. The unexpected mildneſs of ſuch a conduct reconciled the minds of the Syrians, and, as far as the gates of Emeſa, the wiſhes of the people ſeconded the the terror of his arms.

Zenobia would have ill deſerved her reputation, had ſhe indolently permitted the emperor of the Weſt to approach within 100 miles of her capital. The fate of the Eaſt was decided in two great battles; ſo ſimilar in almoſt every circumſtance, that we can ſcarcely diſtinguiſh them from each other, except by obſerving that the firſt was fought near Antioch, and the ſecond near Emeſa. In both, the queen of Palmyra animated the armies by her preſence, and devolved the execution of her orders on Zabdas, who had already ſignalized his military talents by the conqueſt of Egypt. The numerous forces of Zenobia, conſiſted for the moſt part of light archers, and of heavy cavalry clothed in complete ſteel. The Mooriſh and Illyrian horſe of Aurelian were unable to ſuſtain the ponderous charge of their antagoniſts. They fled in real or affected diſorder, engaged the Palmyrenians in a laborious purſuit, haraſſed them by a deſultory combat, and at length diſcomfited this impenetrable but unweildy body of cavalry. The light infantry, in the mean time, when they had exhauſted their quivers, remaining without protection againſt a cloſer onſet, expoſed their naked ſides to the ſwords of the legions. Aurelian had choſen theſe veteran troops, who were uſually ſtationed on the Upper Danube, and whoſe valour had been ſeverely tried in the Allemannic war. After the defeat of Emeſa, Zenobia found it impoſſible to collect a third army. As far as the frontier of Egypt, the nations ſubject to her empire had joined the ſtandard of the conqueror; who detached Probus, the braveſt of his generals, to poſſeſs himſelf of the Egyptian provinces. Palmyra was the laſt reſource of the widow of Odenathus. She retired within the walls of her capital; made every preparation for a vigorous reſiſtance; and declared with the intrepidity of a heroine, that the laſt moment of her reign and of her life ſhould be the ſame.

In his march over the ſandy deſart, between Emeſa and Palmyra, the emperor Aurelian was perpetually haraſſed by the Arabs; nor could he always defend his army, and eſpecially his baggage, from thoſe flying troops of active and daring robbers, who watched the moment of ſurpriſe, and directed the ſlow purſuit of the legions. The ſiege of Palmyra was an object far more difficult and important; and the emperor, who with inceſſant vigour preſſed the attacks in perſon, was himſelf wounded with a dart. "The Roman people, (ſays Aurelian, in an original letter), ſpeak with contempt of the war which I am waging againſt a woman. They are ignorant both of the character and of the power of Zenobia. It is impoſſible to enumerate her warlike preparations, of ſtones, of arrows, and of every ſpecies of miſſile weapons. Every part of the walls is provided with two or three baliſtæ, and artificial fires are thrown from her military engines. The fear of puniſhment has armed her with a deſperate courage. Yet I truſt ſtill in the protecting deities of Rome, who have hitherto been favourable to all my undertakings." Doubtful, however, of the protection of the gods, and of the event of the ſiege, Aurelian judged it more prudent to offer terms of an advantageous capitulation: to the queen, a ſplendid retreat; to the citizens, their ancient privileges. His propoſals were obſtinately rejected,

jected, and the refuſal was accompanied with inſult.

The firmneſs of Zenobia was ſupported by the hope, that in a very ſhort time famine would compel the Roman army to repaſs the deſart; and by the reaſonable expectation that the kings of the Eaſt, and particularly the Perſian monarch, would arm in the defence of their moſt natural ally. But fortune, and the perſeverance of Aurelian, overcame every obſtacle. The death of Sapor, which happened about this time, diſtracted the councils of Perſia; and the inconſiderable ſuccours that attempted to relieve Palmyra, were eaſily intercepted either by the arms or the liberality of the emperor. From every part of Syria a regular ſucceſſion of convoys ſafely arrived in the camp, which was increaſed by the return of Probus with his victorious troops from the conqueſt of Egypt. It was then that Zenobia reſolved to fly. She mounted the fleeteſt of her dromedaries; and had already reached the banks of the Euphrates, about 60 miles from Palmyra, when ſhe was overtaken by the purſuit of Aurelian's light-horſe, ſeized, and brought back a captive to the feet of the emperor. Her capital ſoon after ſurrendered, and was treated with unexpected lenity. The arms, horſes, and camels, with an immenſe treaſure of gold, ſilver, ſilk, and precious ſtones, were all delivered to the conqueror; who, leaving only a garriſon of 600 archers, returned to Emeſa, and employed ſome time in the diſtribution of rewards and puniſhments at the end of ſo memorable a war, which reſtored to the obedience of Rome thoſe provinces that had renounced their allegiance ſince the captivity of Valerian.

When the Syrian queen was brought into the preſence of Aurelian, he ſternly aſked her, How ſhe had preſumed to riſe in arms againſt the emperors of Rome? The anſwer of Zenobia was a prudent mixture of reſpect and firmneſs: "Becauſe I diſdained to conſider as Roman emperors, an Aureolus or a Galienus. You alone I acknowledge as my conqueror and my ſovereign." But as female fortitude is commonly artificial, ſo it is ſeldom ſteady or conſiſtent. The courage of Zenobia deſerted her in the hour of trial; ſhe trembled at the angry clamours of the ſoldiers, who called aloud for her immediate execution; forgot the generous deſpair of Cleopatra, which ſhe had propoſed as her model; and ignominiouſly purchaſed life by the ſacrifice of her fame and her friends. It was to their counſels which governed the weakneſs of her ſex, that ſhe imputed the guilt of her obſtinate reſiſtance; it was on their heads that ſhe directed the vengeance of the cruel Aurelian. The fame of Longinus, who was included among the numerous and perhaps innocent victims of her fear, will ſurvive that of the queen who betrayed, or the tyrant who condemned him. Genius and learning were incapable of moving a fierce unlettered ſoldier, but they had ſerved to elevate and harmoniſe the ſoul of Longinus. Without uttering a complaint, he calmly followed the executioner, pitying his unhappy miſtreſs, and beſtowing comfort on his afflicted friends.

Returning from the conqueſt of the Eaſt, Aurelian had already croſſed the ſtreights which divide Europe from Aſia; when he was provoked by the intelligence that the Palmyrenians had maſſacred the governor and garriſon which he had left among them, and again erected the ſtandard of revolt. Without a moment's deliberation, he once more turned his face towards Syria. Antioch was alarmed by his rapid approach, and the helpleſs city of Palmyra felt the irreſiſtible weight of his reſentment. We have a letter of Aurelian himſelf, in which he acknowleges, that old men, women, children, and peaſants, had been involved in that dreadful execution, which ſhould have been confined to armed rebellion: and although his principal concern ſeems directed to the re-eſtabliſhment of a temple of the Sun, he diſcovers ſome pity for the remnant of the Palmyrenians, to whom he grants the permiſſion of rebuilding and inhabiting their city. But it is eaſier to deſtroy than to reſtore. The ſeat of commerce, of arts, and of Zenobia, gradually ſunk into an obſcure town, a trifling fortreſs, and at length a miſerable village. The ruins of its temples, palaces, and porticos of Grecian architecture, lie ſcattered over an extent of ſeveral miles. Theſe magnificent remains were accidentally diſcovered by ſome Engliſh travellers from Aleppo about a century ago; and moſt ſplendid views have ſince been given of them by Meſſrs Wood and Dawkins, to whoſe work the curious reader is referred.

PALPABLE, ſomething perceivable by the ſenſes, particularly that of feeling.

PALPITATION *of the Heart*. See MEDICINE, n° 206. 395.

PALSY. Ibid. n° 190. 377—380. & p. 4870.

PALUDAMENTUM, in Roman antiquity, a habit that differed but little from the chlamys, except that his laſt belonged chiefly to the lower claſs of people.

PALUS MEOTIS, the ancient name of a gulph between Europe and Aſia, to the north of the Black Sea, now called the *ſea of Zabach*, or *Aſoph*.

PALY, or PALE, in heraldry, is when the ſhield is divided into four or more equal parts, by perpendicular lines falling from the top to the bottom.

PALY *Bende*, is when the eſcutcheon is divided by perpendicular lines, which is *paly*; and alſo by diagonals, which is called *bendy*.

PAMPELUNA, the capital of the kingdom of Navarre in Spain, with a very ſtrong citadel and rich biſhopric. It is handſome and populous, and carries on a great trade, ſeated in a very fertile plain, in E. Long. 1. 25. N. Nat. 42. 42.

PAMPELUNA, a town of New Granada in South America, famous for its gold mines and numerous flocks of ſheep. W. Long. 68. 30. N. Lat. 6. 30.

PAMPHYLIA, the ancient name of a country of Natolia in Aſia, now called *Carimania* and *Cay-bay*, between Lycia and Cilicia, on the ſouth coaſt, to the north of the Mediterranean ſea.

PAN, in Pagan worſhip, the ſon of Mercury and Penelope (the wife of Ulyſſes), who was raviſhed by that god in the form of a white goat, while ſhe was keeping her father's flocks. He was educated on Mount Menelaus, in Arcadia, by Sinœ, and the other nymphs, whom he attracted by his muſic. He afterwards diſtinguiſhed himſelf in the war with the giants, when he entangled Typhon in his nets. He attended Bacchus in his Indian expedition; and when the Gauls were about to pillage the temple of Delphos, he ſtruck them with ſuch a ſudden conſternation by night, that they fled, though none purſued them. He had a conteſt with Cupid; but was conquered by the little god, who puniſhed him, by inſpiring him with a paſſion for the nymph Syrinx, who treated him with diſdain: but he cloſely purſuing her, overtook her by the river Ladon, when, invoking the Naiads, ſhe was changed into a tuft of reeds, which the diſappointed lover graſped in his arms; but obſerving, that as they trembled with the wind, they formed a murmuring ſound, he made of them the pipe for which he became ſo famous. He charmed Luna in the ſhape of a beautiful ram, and had ſeveral other amours.

Pan is repreſented with a ſmiling ruddy face, a thick beard, with the horns, legs, feet, and tail of a goat; holding a ſhepherd's crook in one hand, and his pipe of unequal reeds in the other.

The abbe Banier remarks, that if ever the Greeks corrupted ancient hiſtory, it was in fabricating the fable of Pan. According to them, ſays Herodotus, Hercules Dionyſius, or Bacchus, and Pan, were the laſt of all the gods: however, in the opinion of the Egyptians, Pan was one of the eight great divinities that formed the firſt claſs in their theology, which were the moſt powerful and the moſt ancient of all.

Diodorus makes him one of the attendants upon Oſiris, in his Indian expedition. "Oſiris," ſays this author, "took with him Pan, a perſon much reſpected throughout his dominions: for he had not only his ſtatue afterwards placed in all the temples, but a city was built in the Thebaid; which, in honour of Pan, was called *Chemmis*, or *Chammo*, a word that ſignifies in the Egyptian language *the city of Pan*."

The ſame author, however, tells us, that he was the leader of a troop of fauns and ſatyrs, or wild and ruſtic men, much addicted to ſinging, dancing, and feats of activity, who were preſented to Oſiris in Ethiopia, and with whom that prince was ſo much pleaſed, that he retained them in his ſervice.

Pan was regarded by the Egyptians, after his apotheoſis, as the god who preſided over the whole univerſe, as Παν, *omne*, implies. He repreſented nature and feſtivity; and was god of the woods and fields, wholly taken up with the pleaſures of a country life; dancing conſtantly with the fauns and ſatyrs; and running after the nymphs, to whom he was ſuch a terror, that it is ſuppoſed the word *panic* is derived from *Panici terrores*, with which thoſe who were ſaid to have ſeen him were ſeized. Apuleius, however, gives an agreeable deſcription of him. "By chance the god Pan happened to be ſeated on a little eminence near a river; and, always conſtant in his love to the nymph Syrinx, transformed into a reed, he taught her to produce all kinds of agreeable ſounds, while his goats were ſkipping round him, and feeding on the banks."

Lucian deſcribes him as the companion, miniſter, and counſellor of Bacchus. He was a kind of Scrub, a drudge fit for all work, having been occaſionally employed in the capacity of ſhepherd, muſician, dancer, huntſman, and ſoldier. In ſhort, he ſerved not only as *maeſtro di capello*, in directing the Bacchanals, but was ſo expert in playing upon flutes, and was ſuch an excellent piper on the fiſtula, that Bacchus was never happy without him.

He was particularly honoured in Arcadia, where the ſhepherds offered him milk and honey in wooden bowls: when ſucceſsful in hunting, they gave him a part of the ſpoils; but if they caught nothing, they ſhewed their reſentment by whipping his image.

The Romans adopted him amongſt their deities under the names of *Lupercus* and *Lycæus*.

PANACEA, among phyſicians, denotes an univerſal medicine, or a remedy for all diſeaſes; a thing impoſſible to be obtained.

PANADA, a diet conſiſting of bread boiled in water to the conſiſtence of pulp, and ſweetened with a little ſugar.

PANAMA, the capital city of the province of Darien in South America, where the treaſures of gold and ſilver, and the other rich merchandiſes of Peru, are lodged in magazines till they are ſent to Europe. W. Long. 82. 0. N. Lat. 9. 0.

This town, which had been the gate through which an entrance was gained into Peru, had riſen to great proſperity, when, in 1670, it was pillaged and burnt by pirates. It was rebuilt on a more advantageous ſpot, at the diſtance of four or five miles from the firſt. Its harbour, called *Perico*, is very ſecure. It is formed by an archipelago, conſiſting of 48 ſmall iſlands, and is capable of containing the largeſt fleets.

This place, a little while after it was founded, became the capital of the kingdom of Terra Firma. Some hopes were at firſt entertained from the three provinces of Panama, Darien, and Veragua, which compoſed it; but this proſperity vaniſhed inſtantaneouſly. The ſavages of Darien recovered their independence; and the mines of the two other provinces were found to be neither ſufficiently abundant, nor of an alloy good enough to make it worth while to work them. Five or ſix ſmall boroughs, in which are ſeen ſome Europeans quite naked, and a very ſmall number of Indians, who have come to reſide there, form the whole of this ſtate, which the Spaniards are not aſhamed of honouring with the great name of kingdom. It is in general barren and unwholeſome, and contributes nothing to trade but pearls.

The pearl fiſhery is carried on in the iſlands of the gulph. The greateſt part of the inhabitants employ ſuch of their negroes in it as are good ſwimmers. Theſe ſlaves plunge and replunge in the ſea in ſearch of pearls, till this exerciſe has exhauſted their ſtrength or their ſpirits.

Every negro is obliged to deliver a certain number of oyſters. Thoſe in which there are no pearls, or in which the pearl is not entirely formed, are not reckoned. What he is able to find beyond the ſtipulated obligation, is conſidered as his indiſputable property: he may ſell it to whom he pleaſes; but commonly he cedes it to his maſter at a moderate price.

Sea monſters, which abound more about the iſlands where pearls are found than on the neighbouring coaſts, render this fiſhing dangerous. Some of theſe devour the divers in an inſtant. The manta fiſh, which derives its name from its figure, ſurrounds them, rolls them under its body, and ſuffocates them. In order to defend themſelves againſt ſuch enemies, every diver is armed with a poinard: the moment he perceives any of theſe voracious fiſh, he attacks them with precaution, wounds them, and drives them away. Notwithſtanding this, there are always ſome fiſhermen deſtroyed, and a great number crippled.

The pearls of Panama are commonly of a very fine water. Some of them are even remarkable for their ſize and figure: theſe were formerly ſold in Europe. Since art has imitated them, and the paſſion for diamonds has entirely ſuperſeded or prodigiouſly diminiſhed the uſe of them, they have found a new mart more advantageous than the firſt. They are carried to Peru, where they are in great eſtimation.

This branch of trade has, however, infinitely leſs contributed to give reputation to Panama, than the advantage which it hath long enjoyed of being the mart of all the productions of the country of the Incas, that are deſtined for the old world. Theſe riches, which are brought hither by a ſmall fleet, were carried, ſome on mules, others by the river Chagre, to Porto Bello, that is ſituated on the northern coaſt of the iſthmus which ſeparates the two ſeas.

PANARI, one of the Lipari iſlands lying in the Tuſcan Sea. It is only five miles in circumference, and the ſoil is barren. E. Long. 15. 0. N. Lat. 39. 0.

PANARO, a river of Italy, which riſes in the Appennines, croſſes the valley of Frignano; and running on the confines of the Modeneſe and Bologneſe, waters Fenal, and falls into the Po at Bondeno, ten miles above Ferrara.

PANATHENÆA, in Grecian antiquity an ancient Athenian feſtival, in honour of Minerva the protectreſs of Athens, and called *Athenæa*. There were two feſtivals under this denomination, the greater and the leſſer. The greater panathenæa were exhibited every five years; the leſs every three, or, according to ſome writers, annually. Though the celebration of neither, at firſt, employed more than one day; yet in after-times they were protracted for the ſpace of many days, and ſolemnized with greater preparations and magnificence than at their firſt inſtitution.

Prizes were eſtabliſhed there for three different kinds of combat: the firſt conſiſted of foot and horſe races; the ſecond, of athletic excerciſes; and the third, of poetical and muſical conteſts. Theſe laſt are ſaid to have been inſtituted by Pericles. Singers of the firſt claſs, accompanied by performers on the flute and cithara, exerciſed their talents here, upon ſubject perſcribed by the directors of theſe exhibitions. And while the Athenian ſtate was free and independent, the noble and generous actions of Harmodius and Ariſtogiton, who had oppoſed the power of the Piſiſtratidæ, and of Ariſtobulus, who had delivered the Athenians from the oppreſſion of the thirty tyrants impoſed upon them by the Lacedæmonians, were celebrated in theſe ſongs.

PANAX, Ginseng, a genus of the dioecia order, belonging to the polygamia claſs of plants. There are two ſpecies, the quinquefolium and trifolium. Both theſe are natives of North America. The former is generally believed to be the ſame with the Tartarian ginſeng; the figures and deſcriptions of that plant which have been ſent to Europe by the miſſionaries, agreeing perfectly with the American Plant. This hath a jointed, fleſhy, and taper root, as large as a man's finger, frequently divided into two ſmaller fibres downwards. The ſtalks riſes near a foot and an half high, and is naked at the top, where it generally divides into three ſmaller foot-ſtalks, each ſuſtaining a leaf compoſed of five ſpear-ſhaped lobes, ſawed on their edges: they are of a pale green, and a little hairy. The flowers grow on a ſlender foot-ſtalk, juſt at the diviſion of the foot-ſtalks which ſuſtain the leaves, and are formed into a ſmall umbel at the top; they are of an herbaceous yellow colour, compoſed of ſmall yellow petals, which are recurved. Theſe appear the beginning of June; and are ſucceeded by compreſſed, heart-ſhaped berries, which are firſt green, but afterwards turn red; incloſing two hard, compreſſed, heart-ſhaped ſeeds, which ripen in the beginning of Auguſt. The ſecond ſort grows naturally in the ſame countries: but Mr Miller never ſaw more than one plant, which was ſent to him from Maryland, and did not live beyond the firſt year; being planted in a dry ſoil, in a very dry ſeaſon. The ſtalk was ſingle, and did not riſe more than five inches in height, dividing into three foot-ſtalks, each ſuſtaining a trifoliate leaf, whoſe lobes were longer, narrower, and deeper indented on their edges, than the former. The flower-ſtalk roſe from the diviſions of the foot-ſtalk of the leaves; but before the flowers opened, the plant decayed.

Properties. The root of this plant is uſed in medicine. It is two or three inches long, taper, about the thickneſs of the little finger, often forked at the bottom, which gives it a diſtant reſemblance of a man, whence it is called *ginſeng*; it is elegantly ſtriated with circular wrinkles; it is of a browniſh yellow colour on the outſide, and whitiſh or of a pale yellow within; on the top are commonly one or more little knots, which are the remains of the ſtalks of the preceding years, and from the number of which the age of the root is judged of. Thoſe roots which are brought from China are ſomewhat paler than thoſe from America, but in no ather reſpect is any difference found.

The Chineſe eſteem the ginſeng root as a general reſtorative and corroborant: to the taſte it is mucilaginous, and ſweet like liquorice; yet accompanied with a degree of bitterneſs and a ſlight aromatic warmth, with little or no ſmell: the ſweet matter of theſe roots is preſerved in the watery as well as in the ſpirituous extract, and ſo is their aroma; the ſpirituous extract is a pleaſant warm bitteriſh ſweet.

A dram of the ginſeng root may be ſliced and boiled in a quarter of a pint of water to about two ounces; then a little ſugar being added, it may be drank as ſoon as it is cool enough: the doſe muſt be repeated morning and evening; but the ſecond doſe may be prepared from the ſame portion of root which was uſed at firſt, for it may always be twice boiled. The plant has been introduced into the Britiſh gardens, and will thrive in thoſe places where it hath a light ſoil and ſhady ſituation, and will produce flowers and ſeeds; but the latter, though in appearance ripe and perfect, will not produce any new plants, as Mr Miller ſays he has repeatedly made the experiment, and waited for them three years without diſturbing the ground.

PANAY, an iſland of Aſia, and one of the Philippines, lying between thoſe of Paragoa and Negro. It is 250 miles in circumference, and is the moſt populous and fertile of them all. It is watered by a great number of rivers and brooks, and produces a great quantity of rice.

PANACARPUS, in Roman antiquity, a kind of ſhew which the Roman emperors frequently exhibited to the people. In this ſpectacle, the Circus being all ſet over with large trees, repreſented a foreſt, into which the beaſts being let from the dens underground, the people, at a ſign given by the emperor, purſued, ſhot, and killed all they could lay hold of, which they afterwards carried away, to regale upon at home. The beaſts uſually given on theſe occaſions were boars, deers oxen, and ſheep.

PANCIROLLUS (Guy), a famous lawyer of Rhegium, was a perſon of an excellent genius, which he cultivated with the greateſt care in the principal univerſities of Italy; and was afterwards ordinary profeſſor of law at Padua. Philibert Emanuel, duke of Savoy, invited him to his univerſity in 1571, where he compoſed his ingenious treatiſe *De rebus inventis et deperditis*. But the air of Turin not agreeing with him, he there loſt an eye; and, for fear of loſing the other, returned to Padua, where he died in 1591.

PANCREAS, in anatomy. See there, n° 356.

PANDATARIA, (Suetonius, Pliny, Strabo); *Pandateria*, (Mela, Tacitus): An iſland in the Tuſcan ſea; a place of baniſhment for the more illuſtrious exiles. Hither Julia, the daughter of Auguſtus, was baniſhed for her incontinence. To this iſland Tiberius baniſhed Agrippina, his daughter-in-law, (Suetonius). It was the place of confinement of Octavia, the daughter of Cladius, married to Nero; a ſight that affected every eye, (Tacitus). Now *Santa Maria*, ſituate berween Pontia and Iſchia, (Holſtenius).

PANDECTS, PANDECTÆ, in juriſprudence, the digeſt, or collection, made by Juſtinian's order, of 534 deciſions or judgments of the ancient lawyers, on ſo many queſtions occurring in the civil law; to which that emperor gave the force and authority of law, by the epiſtle prefixed to them.—The word is Greek, Πανδεκται, compounded of ϖαν, "all," and δεχομαι, *capio*, "I take;" *q. d.* a compilation, or a book containing all things.—Though others, as Bartoli, will have it formed from ταν, and δεχομαι; as if theſe books contained the whole doctrine of the law.

The pandects conſiſt of 50 books, and make the firſt part of the body of the civil law.

They were denoted by two ππ; but the copiſts taking thoſe ππ for *ff*, the cuſtom aroſe of quoting them by *ff*.

The *Florentine pandects*, are thoſe printed from a famous ancient manuſcript at Florence.

Papias extends the denomination of *pandects*, to the Old and New Teſtament.

There are alſo PANDECTA *Medicinæ*, "Pandects of Medicine;" a kind of dictionary of things relating to medicine, compiled by Mat. Sylvaticus of Mantua, who lived about the year 1297. Leunclavius has publiſhed *Pandects of Turky;* and biſhop Beveridge, *Pandecta canonum*.

PANDICULATION, a ſtretching; or that violent and tenſive motion of the ſolids, which uſually accompanies the act of yawning.

PANDORA, in fabulous hiſtory, a woman formed by Prometheus, to whom each of the gods gave ſome perfection. Venus beſtowed upon her beauty; Pallas, wiſdom; Juno, riches; Apollo, muſic; and Mercury, eloquence: but Jupiter being diſpleaſed at Prometheus for having ſtolen fire from heaven to animate the maſs he had formed, gave Pandora a box, which ſhe was ordered not to open; and then ſent her to the earth with this box, in which were incloſed age, diſeaſes, peſtilence, war, famine, envy, diſcord, and all the evils and vices that could afflict mankind. This fatal box was opened by Epimetheus, Prometheus's brother, when inſtantly all the diſeaſes and miſchiefs with which it was filled ſpread over the earth, and Hope alone remained at the bottom.

PANDOURS, are Hungarian infantry: they wear a looſe garment fixed tight to their bodies by a girdle, with great ſleeves, and large breeches hanging down to their ancles. They uſe fire-arms, and are excellent markſmen: they alſo uſe a kind of ſabre near four feet long, which they uſe with great dexterity.

PANDOSIA, (Livy, Juſtin, Strabo), an inland town of the Brutti, and a place of ſtrength, on the river Acheron, where Alexander of Epirus, deceived by the oracle of Dodona, met his fate and periſhed. Now *Mendicino*, (Holſtenius). Another of Epirus, (Strabo); ſituate on the river Acheron, (Livy); which Alexander of Epirus was adviſed to avoid as fatal, but which he met with in Italy. This laſt is ſaid to have been the reſidence of the Oenotrian kings, (Strabo.)

PANEAS, (Pliny, Joſephus); the apparent ſpring from which the Jordan riſes, on the extremity of the weſt ſide of the Trachonitis, (Pliny).

PANEAS, (Coins, Pliny, Joſephus), the name of a diſtrict adjoining to the ſpring *Paneas*, with a cognominal town, either enlarged and adorned, or originally built, by Philip ſon of Herod, and called *Cæſarea*, by Joſephus; and in St Matthew, *Cæſarea of Philip;* with a temple erected to Auguſtus his benefactor, who conferred the Trachonitis upon him, (coin). It was afterwards called *Neronias*, in honour of Nero, (Joſephus).

PANEGYRIC, an oration in praiſe of ſome extraordinary thing, perſon, or virtue.

The name is Greek, πανηγυρις; formed of ϖαν, "all," and αγειρω, "I aſſemble;" becauſe anciently held in public and ſolemn aſſemblies of the Greeks, either at their games, their feaſts, fairs, or religious meetings.

PANEGYRICUM, in church-hiſtory, an eccleſiaſtical book, uſed by the Greek church, containing the panegyrical orations of various authors, on the ſolemnities of Jeſus Chriſt and the ſaints.

Among the principal authors of this work are Athanaſius, Cyrill, Baſil, Chryſoſtom, &c.

PANEL, *(Panella, Panellum)*, according to Sir Edw. Coke, denotes a little part; but the learned Spelman ſays, that it ſignifies *ſchedula vel pagina*, a "ſchedule or roll;" as a panel of parchment, or a counterpane of an indenture: but it is uſed more particularly for a ſchedule or roll, containing the names of ſuch jurors as the ſheriff returns to paſs upon any trial. And the *impanelling* a jury is the entering their names in a panel, or little ſchedule of parchment.

PANEL, in Scots law, ſignifies the priſoner at the bar, or perſon who takes his trial before the court of juſticiary for ſome crime.

PANGONIA, in natural hiſtory, the name of a genus of cryſtals, conſiſting of ſuch as are compoſed of many angles.

PANIC, denotes an ill-grounded terror or fright. See PAN.

PANICLE, in botany, denotes a ſoft woolly beard, on which the ſeeds of ſome plants, as millet, reeds, and hay.

PANNELS *of a* SADDLE, are two cuſhions or bolſters, filled with cows, deer, or horſe's hair, and placed under the ſaddle, on each ſide, to prevent the bows and bands from galling the horſe.

PANNICULUS CARNOSUS, in comparative anatomy, a robuſt fleſhy tunic, ſituated in beaſts between the ſkin and the fat; by means of which they can move their ſkin in whole or in part. It is altogether wanting in mankind.

PANNONIA, (Pliny, Strabo, Dio), an extenſive country of Europe, having the Danube on the north, Dalmatia on the ſouth, Noricum on the weſt, and Moeſia on the eaſt. It is divided in *ſuperior* and *inferior*, (Ptolemy, Dio). The common boundary between both were the river Arabo and mount Cetius, having the ſuperior to the weſt, and the inferior on the eaſt ſide. This diviſion is thought to be no older than the times of the Antonines. *Pannonicus* the epithet, (Martial).

PANORMUS, (Polybius, Pauſanias), a town of Achaia, in Peloponneſus, near the promontory Rhium.—Another, (Ptolemy, Pliny,) a town on the north ſide of Crete.—A third, (Ptolemy), in Macedonia, on the Egean ſea, near mount Athos.—A fourth, of Samos, (Livy.)—A fifth, of Sicily; an ancient city, built by the Phœnicians, (Thucydides); a principal town of the Carthaginians, (Polybius); ſituate between Lilybæus and Pelorus, (Mela): a Roman colony. Now *Palermo*, capital of the iſland, on the north ſide. E. Long. 13. N. Lat. 38. 30.—A ſixth Panormus of the Thracia Cherſoneſus, placed by Pliny on the weſt ſide of the peninſula, and mentioned by no other writer.

PANORMUS, (Ptolemy), a port of Attica; its name denoting it to be capacious.—Another, of Epirus, (Strabo, Ptolemy); a large harbour in the heart of the Montes Cerauni, below the citadel Chimæra.—A third, of Ionia, (Strabo); near Epheſus, with the temple of the Epheſian Diana.

PANORPA, the SCORPION-FLY, in zoology, a genus of inſects belonging to the order of neuroptera. The roſtrum is horny and cylindrical; there are two pappi, and three ſtemonata; the feelers are longer than the thorax; and the tail of the male is furniſhed with a forceps. There are four ſpecies, diſtinguiſhed by the colour and ſhape of their wings. They ſkip, and are found in meadows.

PANTALARIA, an iſland in the Mediterranean Sea, between Sicily and the main land of Africa, about 17 miles in circumference. It is near the coaſt of Tunis, and abounds in cotton, fruits, and wine; but the inhabitants are obliged to bring all their corn to Sicily, as it belongs to the king of the two Sicilies. E. Long. 12. 25. N. Lat. 36. 55.

PANTALOON, a ſort of garment conſiſting of breeches and ſtockings all of one piece; ſaid to have been firſt introduced by the Venetians.

PANTHEON, a beautiful edifice at Rome, anciently a temple, dedicated to all the gods; but now converted into a church, and dedicated to the Virgin and all the martyrs.

This edifice is generally thought to have been built by Agrippa ſon-in-law to Auguſtus, becauſe it has the following inſcription on the frieze of the portico:

M. AGRIPPA L. F. COS. TERTIUM FECIT.

Several antiquarians and artiſts, however, have ſuppoſed that the pantheon exiſted in the times of the commonwealth; and that it was only embelliſhed by Agrippa, who added the portico. Be this as it will, however, the pantheon when perfected by Agrippa was an exceedingly magnificent building; the form of whoſe body is round or cylindrical, and its roof or dome is ſpherical: it is 144 feet diameter within; and the height of it, from the pavement to the grand aperture on its top, through which it receives the light, is juſt as much. It is of the Corinthian order. The inner circumference is divided into ſeven grand niches, wrought in the thickneſs of the wall: ſix of which are flat at the top; but the ſeventh, oppoſite to the entrance, is arched. Before each niche are two columns of antique yellow marble fluted, and of one entire block, making in all 14, the fineſt in Rome. The whole wall of the temple, as high as the grand cornice incluſive, is caſed with divers ſorts of precious marble in compartments. The frieze is entirely of porphyry. Above the grand cornice ariſes an attic, in which were wrought, at equal diſtances, 14 oblong ſquare niches: between each niche were four marble pilaſters, and between the pilaſters marble tables of various kinds. This attic had a complete entablature; but the cornice projected leſs than that of the grand order below. Immediately from the cornice ſprings the ſpherical roof, divided by bands, which croſs each other like the meridians and parallels of an artificial terreſtrial globe. The ſpaces between the bands decreaſe in ſize as they approach the top of the roof; to which, however, they do not reach, there being a conſiderable plain ſpace between them and the great opening. That ſo bold a roof might be as light as poſſible, the architect formed the ſubſtance of the ſpaces between the bands, of nothing but lime and pumice ſtones. The walls below were decorated with lead and braſs, and works of carved ſilver over them; and the roof was covered on the outſide with plates of gilded bronze. There was an aſcent from the ſpringing of the roof to the very ſummit by a flight of ſeven ſtairs. And if certain authors may be credited, theſe ſtairs were ornamented with pedeſtrian ſtatues, ranged as an amphitheatre. This notion was founded on a paſſage of Pliny, who ſays, "That Diogenes the ſculptor decorated the pantheon of Agrippa with elegant ſtatues; yet that it was difficult to judge of their merit, upon account of their elevated ſituation." The portico is compoſed of 16 columns of granite, four feet in diameter, eight of which ſtand in front, with an equal intercolumniation all along, contrary to the rule of Vitruvius, who is for having the ſpace anſwering to the door of a temple, wider than the reſt. On theſe columns is a pediment, whoſe tympanum, or flat, was ornamented with bas-reliefs in braſs; the croſs beams which formed the ceiling of the portico were covered with the ſame metal, and ſo were the doors. The aſcent up to the portico was by eight or nine ſteps.

Such was the pantheon, the richneſs of which induced great number of rivers and brooks, and produces a great quantity of rice.

PANACARPUS, in Roman antiquity, a kind of ſhew which the Roman emperors frequently exhibited to the people. In this ſpectacle, the Circus being all ſet over with large trees, repreſented a foreſt, into which the beaſts being let from the dens underground, the people, at a ſign given by the emperor, purſued, ſhot, and killed all they could lay hold of, which they afterwards carried away, to regale upon at home. The beaſts uſually given on theſe occaſions were boars, deers oxen, and ſheep.

PANCIROLLUS (Guy), a famous lawyer of Rhegium, was a perſon of an excellent genius, which he cultivated with the greateſt care in the principal univerſities of Italy; and was afterwards ordinary profeſſor of law at Padua. Philibert Emanuel, duke of Savoy, invited him to his univerſity in 1571, where he compoſed his ingenious treatiſe *De rebus inventis et deperditis*. But the air of Turin not agreeing with him, he there loſt an eye; and, for fear of loſing the other, returned to Padua, where he died in 1591.

PANCREAS, in anatomy. See there, n° 356.

PANDATARIA, (Suetonius, Pliny, Strabo); *Pandateria*, (Mela, Tacitus): An iſland in the Tuſcan ſea; a place of baniſhment for the more illuſtrious exiles. Hither Julia, the daughter of Auguſtus, was baniſhed for her incontinence. To this iſland Tiberius baniſhed Agrippina, his daughter-in-law, (Suetonius). It was the place of confinement of Octavia, the daughter of Cladius, married to Nero; a ſight that affected every eye, (Tacitus). Now *Santa Maria*, ſituate berween Pontia and Iſchia, (Holſtenius).

PANDECTS, PANDECTÆ, in juriſprudence, the digeſt, or collection, made by Juſtinian's order, of 534 deciſions or judgments of the ancient lawyers, on ſo many queſtions occurring in the civil law; to which that emperor gave the force and authority of law, by the epiſtle prefixed to them.—The word is Greek, Πανδεκται, compounded of ϖαν, "all," and δεχομαι, *capio*, "I take;" *q. d.* a compilation, or a book containing all things.—Though others, as Bartoli, will have it formed from ταν, and δεχομαι; as if theſe books contained the whole doctrine of the law.

The pandects conſiſt of 50 books, and make the firſt part of the body of the civil law.

They were denoted by two ππ; but the copiſts taking thoſe ππ for *ff*, the cuſtom aroſe of quoting them by *ff*.

The *Florentine pandects*, are thoſe printed from a famous ancient manuſcript at Florence.

Papias extends the denomination of *pandects*, to the Old and New Teſtament.

There are alſo PANDECTA *Medicinæ*, "Pandects of Medicine;" a kind of dictionary of things relating to medicine, compiled by Mat. Sylvaticus of Mantua, who lived about the year 1297. Leunclavius has publiſhed *Pandects of Turky;* and biſhop Beveridge, *Pandecta canonum.*

PANDICULATION, a ſtretching; or that violent and tenſive motion of the ſolids, which uſually accompanies the act of yawning.

PANDORA, in fabulous hiſtory, a woman formed by Prometheus, to whom each of the gods gave ſome perfection. Venus beſtowed upon her beauty; Pallas, wiſdom; Juno, riches; Apollo, muſic; and Mercury, eloquence: but Jupiter being diſpleaſed at Prometheus for having ſtolen fire from heaven to animate the maſs he had formed, gave Pandora a box, which ſhe was ordered not to open; and then ſent her to the earth with this box, in which were incloſed age, diſeaſes, peſtilence, war, famine, envy, diſcord, and all the evils and vices that could afflict mankind. This fatal box was opened by Epimetheus, Prometheus's brother, when inſtantly all the diſeaſes and miſchiefs with which it was filled ſpread over the earth, and Hope alone remained at the bottom.

PANDOURS, are Hungarian infantry: they wear a looſe garment fixed tight to their bodies by a girdle, with great ſleeves, and large breeches hanging down to their ancles. They uſe fire-arms, and are excellent markſmen: they alſo uſe a kind of ſabre near four feet long, which they uſe with great dexterity.

PANDOSIA, (Livy, Juſtin, Strabo), an inland town of the Brutti, and a place of ſtrength, on the river Acheron, where Alexander of Epirus, deceived by the oracle of Dodona, met his fate and periſhed. Now *Mendicino*, (Holſtenius). Another of Epirus, (Strabo); ſituate on the river Acheron, (Livy); which Alexander of Epirus was adviſed to avoid as fatal, but which he met with in Italy. This laſt is ſaid to have been the reſidence of the Oenotrian kings, (Strabo.)

PANEAS, (Pliny, Joſephus); the apparent ſpring from which the Jordan riſes, on the extremity of the weſt ſide of the Trachonitis, (Pliny).

PANEAS, (Coins, Pliny, Joſephus), the name of a diſtrict adjoining to the ſpring *Paneas*, with a cognominal town, either enlarged and adorned, or originally built, by Philip ſon of Herod, and called *Cæſarea*, by Joſephus; and in St Matthew, *Cæſarea of Philip;* with a temple erected to Auguſtus his benefactor, who conferred the Trachonitis upon him, (coin). It was afterwards called *Neronias*, in honour of Nero, (Joſephus).

PANEGYRIC, an oration in praiſe of ſome extraordinary thing, perſon, or virtue.

The name is Greek, πανηγυρις; formed of ϖαν, "all," and αγειρω, "I aſſemble;" becauſe anciently held in public and ſolemn aſſemblies of the Greeks, either at their games, their feaſts, fairs, or religious meetings.

PANEGYRICUM, in church-hiſtory, an eccleſiaſtical book, uſed by the Greek church, containing the panegyrical orations of various authors, on the ſolemnities of Jeſus Chriſt and the ſaints.

Among the principal authors of this work are Athanaſius, Cyrill, Baſil, Chryſoſtom, &c.

PANEL, *(Panella, Panellum)*, according to Sir Edw. Coke, denotes a little part; but the learned Spelman ſays, that it ſignifies *ſchedula vel pagina*, a "ſchedule or roll;" as a panel of parchment, or a counterpane of an indenture: but it is uſed more particularly for a ſchedule or roll, containing the names of ſuch jurors as the ſheriff returns to paſs upon any trial. And the *impanelling* a jury is the entering their names in a panel, or little ſchedule of parchment.

PANEL, in Scots law, ſignifies the priſoner at the bar, or perſon who takes his trial before the court of juſticiary for ſome crime.

PANGONIA, in natural hiſtory, the name of a genus of cryſtals, conſiſting of ſuch as are compoſed of many angles.

PANIC, denotes an ill-grounded terror or fright. See PAN.

PANICLE, in botany, denotes a ſoft woolly beard, on which the ſeeds of ſome plants, as millet, reeds, and hay.

PANNELS *of a* SADDLE, are two cuſhions or bolſters, filled with cows, deer, or horſe's hair, and placed under the ſaddle, on each ſide, to prevent the bows and bands from galling the horſe.

PANNICULUS CARNOSUS, in comparative anatomy, a robuſt fleſhy tunic, ſituated in beaſts between the ſkin and the fat; by means of which they can move their ſkin in whole or in part. It is altogether wanting in mankind.

PANNONIA, (Pliny, Strabo, Dio), an extenſive country of Europe, having the Danube on the north, Dalmatia on the ſouth, Noricum on the weſt, and Moeſia on the eaſt. It is divided in *ſuperior* and *inferior*, (Ptolemy, Dio). The common boundary between both were the river Arabo and mount Cetius, having the ſuperior to the weſt, and the inferior on the eaſt ſide. This diviſion is thought to be no older than the times of the Antonines. *Pannonicus* the epithet, (Martial).

PANORMUS, (Polybius, Pauſanias), a town of Achaia, in Peloponneſus, near the promontory Rhium. —Another, (Ptolemy, Pliny,) a town on the north ſide of Crete.—A third, (Ptolemy), in Macedonia, on the Egean ſea, near mount Athos.—A fourth, of Samos, (Livy.)—A fifth, of Sicily; an ancient city, built by the Phœnicians, (Thucydides); a principal town of the Carthaginians, (Polybius); ſituate between Lilybæus and Pelorus, (Mela): a Roman colony. Now *Palermo*, capital of the iſland, on the north ſide. E. Long. 13. N. Lat. 38. 30.—A ſixth Panormus of the Thracia Cherſoneſus, placed by Pliny on the weſt ſide of the peninſula, and mentioned by no other writer.

PANORMUS, (Ptolemy), a port of Attica; its name denoting it to be capacious.—Another, of Epirus, (Strabo, Ptolemy); a large harbour in the heart of the Montes Cerauni, below the citadel Chimæra.—A third, of Ionia, (Strabo); near Epheſus, with the temple of the Epheſian Diana.

PANORPA, the SCORPION-FLY, in zoology, a genus of inſects belonging to the order of neuroptera. The roſtrum is horny and cylindrical; there are two pappi, and three ſtemonata; the feelers are longer than the thorax; and the tail of the male is furniſhed with a forceps. There are four ſpecies, diſtinguiſhed by the colour and ſhape of their wings. They ſkip, and are found in meadows.

PANTALARIA, an iſland in the Mediterranean Sea, between Sicily and the main land of Africa, about 17 miles in circumference. It is near the coaſt of Tunis, and abounds in cotton, fruits, and wine; but the inhabitants are obliged to bring all their corn to Sicily, as it belongs to the king of the two Sicilies. E. Long. 12. 25. N. Lat. 36. 55.

PANTALOON, a ſort of garment conſiſting of breeches and ſtockings all of one piece; ſaid to have been firſt introduced by the Venetians.

PANTHEON, a beautiful edifice at Rome, anciently a temple, dedicated to all the gods; but now converted into a church, and dedicated to the Virgin and all the martyrs.

This edifice is generally thought to have been built by Agrippa ſon-in-law to Auguſtus, becauſe it has the following inſcription on the frieze of the portico:

M. AGRIPPA L. F. COS. TERTIUM FECIT.

Several antiquarians and artiſts, however, have ſuppoſed that the pantheon exiſted in the times of the commonwealth; and that it was only embelliſhed by Agrippa, who added the portico. Be this as it will, however, the pantheon when perfected by Agrippa was an exceedingly magnificent building; the form of whoſe body is round or cylindrical, and its roof or dome is ſpherical: it is 144 feet diameter within; and the height of it, from the pavement to the grand aperture on its top, through which it receives the light, is juſt as much. It is of the Corinthian order. The inner circumference is divided into ſeven grand niches, wrought in the thickneſs of the wall: ſix of which are flat at the top; but the ſeventh, oppoſite to the entrance, is arched. Before each niche are two columns of antique yellow marble fluted, and of one entire block, making in all 14, the fineſt in Rome. The whole wall of the temple, as high as the grand cornice incluſive, is caſed with divers ſorts of precious marble in compartments. The frieze is entirely of porphyry. Above the grand cornice ariſes an attic, in which were wrought, at equal diſtances, 14 oblong ſquare niches: between each niche were four marble pilaſters, and between the pilaſters marble tables of various kinds. This attic had a complete entablature; but the cornice projected leſs than that of the grand order below. Immediately from the cornice ſprings the ſpherical roof, divided by bands, which croſs each other like the meridians and parallels of an artificial terreſtrial globe. The ſpaces between the bands decreaſe in ſize as they approach the top of the roof; to which, however, they do not reach, there being a conſiderable plain ſpace between them and the great opening. That ſo bold a roof might be as light as poſſible, the architect formed the ſubſtance of the ſpaces between the bands, of nothing but lime and pumice ſtones. The walls below were decorated with lead and braſs, and works of carved ſilver over them; and the roof was covered on the outſide with plates of gilded bronze. There was an aſcent from the ſpringing of the roof to the very ſummit by a flight of ſeven ſtairs. And if certain authors may be credited, theſe ſtairs were ornamented with pedeſtrian ſtatues, ranged as an amphitheatre. This notion was founded on a paſſage of Pliny, who ſays, "That Diogenes the ſculptor decorated the pantheon of Agrippa with elegant ſtatues; yet that it was difficult to judge of their merit, upon account of their elevated ſituation." The portico is compoſed of 16 columns of granite, four feet in diameter, eight of which ſtand in front, with an equal intercolumniation all along, contrary to the rule of Vitruvius, who is for having the ſpace anſwering to the door of a temple, wider than the reſt. On theſe columns is a pediment, whoſe tympanum, or flat, was ornamented with bas-reliefs in braſs; the croſs beams which formed the ceiling of the portico were covered with the ſame metal, and ſo were the doors. The aſcent up to the portico was by eight or nine ſteps.

Such was the pantheon, the richneſs of which induced Pliny to rank it among the wonders of the world.

The eruption of Veſuvius, in the reign of Tiberius, damaged the pantheon very conſiderably; it was repaired by Domitian, which occaſioned ſome writers to mention that prince as the founder of the building. The emperor Adrian alſo did ſomething to it. But it appears, that the pantheon is more indebted to Septimius Severus, than to any one ſince its erection. The moſt, perhaps, that any of his predeceſſors had done, was the adding ſome ornament to it: Septimius beſtowed eſſential reparations upon it. The following inſcription appears upon the architrave:

IMP. CAES. SEPTIMIUS. SEVERVS.
PIVS PERTINAX.
ARABICVS. PARTHICVS. PONTIF.
MAX. TRIB. POT.
XI. COS. III. P. P. ET. IMP. CAES.
MARCVS.
AVRELIVS. ANTONINVS. PIVS.
FELIX. AVG. TRIB.
POT. V. COS. PROCOS. PANTHEVM.
VETVSTATE.
OBRVPTVM. CVM. OMNI. CVLTV.
RESTITVERVNT.

It is really a manner of aſtoniſhment, that a ſtructure, which, granting it to have been built by Agrippa, was not more than 200 years old, ſhould have fallen into decay through age. This ſingle conſideration ſeems ſufficient to confirm the opinion of thoſe who believe it to have ſtood in the time of the commonwealth.

The temple ſubſiſted in all its grandeur, till the incurſion of Alaric in the time of Honorius. Zozymus relates, that the Romans having engaged to furniſh this barbarian prince with 3000 pounds weight of gold, and 5000 pounds weight of ſilver, upon condition that he ſhould depart from their walls; and it proving impoſſible to raiſe thoſe ſums either out of the public treaſury or private purſes, they were obliged to ſtrip the temples of their ſtatues and ornaments of gold and ſilver. It is probable that the pantheon ſupplied a good part, as that of Jupiter Capitolinus was the only one in Rome that could vie with it for riches.

Alaric carried off nothing from the Romans beſides their precious metals. Thirty-nine years after this, Genſeric king of the Vandals took away part of their marbles; and whether from a greedineſs of plunder, or from a reliſh of the productions of art, loaded one of his ſhips with ſtatues. It cannot be queſtioned, but that on this occaſion the pantheon was forced to part with more of its ornaments, and that the ineſtimable works of Diogenes became the prey of this Barbarian.

Before theſe unwelcome viſits of the Goths and Vandals, the Chriſtian emperors had iſſued edicts for demoliſhing the pagan temples. But the Romans, whatever were their motives, ſpared the pantheon, which is known to have ſuffered no damage from the zeal of the pontiffs, or the indignation of the ſaints, before the firſt ſiege of Rome by Alaric. It remained ſo rich till about the year 655, as to excite the avarice of Conſtantine II. who came from Conſtantinople to pillage the pantheon, and executed his purpoſe ſo far as to ſtrip it both of its inſide and outſide brazen coverings, which he tranſported to Syracuſe, where they ſoon after fell into the hands of the Saracens.

About 50 years before this, pope Boniface IV. had obtained the pantheon of the emperor Phocas, to make a church of it. The artiſts of thoſe days were totally ignorant of the excellence of the Greek and Roman architecture, and ſpoiled every thing they laid their hands upon. To this period, certain alterations are to be referred, of which we ſhall ſpeak by and by.

After the devaſtations of the barbarians, Rome was contracted within a narrow compaſs: the ſeven hills were abandoned; and the Campus Martius, being an even plain, and near the Tyber, became the groundplat of the whole city. The pantheon, happening to ſtand at the entrance of the Campus Martius, was preſently ſurrounded with houſes, which ſpoiled the fine proſpect of it; and it was yet more deplorably diſgraced by ſome of them which ſtood cloſe to its walls. Pedlars ſhades were built even within its portico, and the intercolumniations were bricked up, to the irreparable damage of the matchleſs pillars, of which ſome loſt part of their capitals, ſome of their baſes, and others were chiſſeled out ſix or ſeven inches deep, and as many feet high, to let in poſts. Which excavations are to this day half filled up with brick and mortar; a ſad monument of the licentiouſneſs of the vulgar, and of the ſtupid avarice of thoſe who ſold them the privilege to ruin the nobleſt piece of art in the world!

This diſorder continued till the pontificate of Eugene IV. whoſe zeal for the decency of a conſecrated place, prevailed upon him to have all the houſes cleared away that incumbered the pantheon, and ſo the miſerable barracks in the portico were knocked down.

From the time Conſtantius carried off the braſs plating of the external roof, that part was expoſed to the injuries of the weather, or at beſt was but ſlightly tiled in, till Benedict II. covered it with lead, which Nicholas V. renewed in a better ſtyle.

It does not appear that from this time to Urban VIII. any pope did any thing remarkable to the pantheon.

Raphael Urban, who had no equal as a painter, and who as an architect had no ſuperior, left a conſiderable ſum by his will for the reparation of the pantheon, where his tomb is placed. Perino de la Vagua, Jacomo Udino, Annibale Carrachi, Flamingo Vacca, and the celebrated Archangelo Corelli, did the ſame. All the ornaments within, that have any claim to be called good, are of the latter times; the paintings merit eſteem; and the ſtatues, though not maſter-pieces, do honour to ſculpture, which alone is a proof that they are poſterior to the 15th century.

But, with all the reſpect due to a pontiff, who was otherwiſe a protector, and even a practiſer of the arts, it were much to be wiſhed that Urban VIII. had not known that the pantheon exiſted. The inſcriptions cut at the ſide of the door inform us, that he repaired it; yet, at the ſame time that he built up with one hand, he pulled down with the other. He cauſed two bellfries of a wretched taſte to be erected on the ancient front work, and he diveſted the portico of all the remains of its ancient grandeur, *viz.* the brazen coverture of the croſs beams, which amounted to ſuch a prodigious quantity, that not only the vaſt baldaquin, or canopy, of the confeſſional in St Peter's, was caſt out of it, but likewiſe a great number of cannon for the caſtle of St Angelo. This pope, who was of the family of Barbarini, preſented alſo as much of this metal to his nephew, as was ſufficient for the decoration of his new palace; on which occaſion this remarkable paſquinade was ſtuck up,

Quod non fecerunt Barbari fecere Barbarini.

If ever gingle added force to wit, it was certainly in this inſtance.

It is ſurpriſing, that whilſt all theſe operations were carrying on in the portico, he never once thought of repairing the damages which time had wrought in it! Of the 16 pillars which ſupported this magnificent pile, there were no more than 13 left; the three next the temple of Minerva had diſappeared; with theſe the entablature and an angle of the front had tumbled down. There were not wanting in Rome fragments enough of antique columns that might have been put together and ſet up, to have prevented the downfall of a pile which deſerved to ſtand as long as the world endured.

Alexander VII. did what Urban VIII. had neglected to do. At the ſame time that Bernini was conſtructing the colonnade of St Peter, this pontiff ordered ſearch to be made for pillars to match thoſe of the portico of the pantheon; and ſome were found not far from the French church of St Lewis, of the very ſame model. They were granite of the iſle of Ilva, and thoſe of the portico were Egyptian granite; the colour, however, was the ſame, ſo that the effect was equal. The pope's zeal did not ſtop here; he cauſed all the old houſes before the portico to be pulled down, and the ſoil and rubbiſh to be cleared away, which covered the ſteps, and even the baſes of ſome of the pillars. He began covering the roof with marble, and raiſed a lantern over the aperture, to keep out rain; but death took him off before his project was completed. Clement IX. his ſucceſſor, incloſed the portico within iron rails. Several later popes have added to its decorations, which were all in the taſte of the times they were done in, and the body of the edifice and its architecture gained nothing from them. The main object of their holineſſes liberality was the embelliſhment of the grand altar. One gave purple curtains, another beſtowed ſilver tabernacles; others again vaſes, and ſuperb dreſſes, ſuited to the ſolemn ceremonies of religion. All theſe might be called rich; but they had in no ſenſe a tendency to retrieve the ancient majeſty or original ſplendour of the temple. The true guſto of the ornaments was a little imitated at the revival of the arts. Good ſtatues took place of the ſkeletons and ſquat figures that ridiculouſly diſgraced the altars for the ſpace of eight centuries. The paintings of Perugino, Cozza, and Greſſi, covered the dull moſaics with which the Greeks of Conſtantinople had loaded the walls of moſt of the churches in Rome. The porphyry and the green and yellow antique, found among the old ruins, were employed to much advantage.

PANTHER, in zoology. See Leo.

PANTOMIME, Παντομιμος, among the ancients, a perſon who could imitate all kind of actions and characters by ſigns and geſtures, without ſpeaking.

The pantomimes made a part in the theatrical entertainments of the ancients; their chief employment was to expreſs, in geſtures and action, whatever the chorus ſung, changing their countenance and behaviour as the ſubject of the ſong varied. They were very ancient in Greece, being derived from the heroic times, according to ſome; but however this may be, they were certainly known in Plato's time. In Rome it was ſo late as the time of Auguſtus before they made their appearance. As to their dreſs, it was various, being always ſuited as near as poſſible to that of the perſon they were to imitate. The crocota was much uſed among the Roman pantomimes, in which and other female dreſſes they perſonated women.

PANUCO, a town and province of North America, in New Spain, lying to the north of Mexico, with a biſhop's ſee. There are veins of gold, and ſalt-works, which are the principal revenue of the inhabitants. It is ſeated near the mouth of a river of the ſame name, at a ſmall diſtance from the Gulph of Mexico. W. Long. 100 5. N. Lat. 24. 0.

PAPA, a ſmall but ſtrong town of Lower Hungary, in the county of Veſprin. It was taken from the Turks in 1683, after raiſing the ſiege of Vienna, and is ſubject to the houſe of Auſtria. It is ſeated on a mountain, near the river Marchaez, in E. Long. 18. 10. N. Lat. 47. 20.

PAPAVER, the Poppy; a genus of the monogynia order, belonging to the polyandria claſs of plants.

Species. 1. The ſomniferum, or ſomniferous common garden-poppy, riſes with an upright ſmooth ſtalk, dividing or branching a yard or more high; garniſhed with large, deeply jagged, amplexicaule, ſmooth leaves; and terminated by large, ſpreading, dark-purple, and other coloured flowers, in the varieties, having ſmooth cups and capſules, flowering in June and July. There are a great many varieties, ſome of them extremely beautiful. The white officinal poppy is one of the varieties of this ſort. It grows often to the height of five or ſix feet, having large flowers both ſingles and doubles, ſucceeded by capſules or heads as large as oranges, each containing about 8000 ſeeds. 2. The rhoeas, or wild globular-headed poppy, riſes with an upright, hairy, multiflorous ſtalk branching a foot and an half high; garniſhed with long, pinnatified, deeply cut, hairy leaves; the ſtalk terminated by many red and other coloured flowers in the varieties, ſucceeded by globular ſmooth capſules. The flowers appear in June. 3. The Cambricum, or Welſh poppy, has a perennial root, pinnated cut leaves, ſmooth, upright, multiflorous ſtalks a foot and an half high; garniſhed with ſmall pinnated leaves, and terminated by many large yellow flowers, ſucceeded by ſmooth capſules. The flowers appear in June. 4. The orientalis, or oriental poppy, hath a large, thick, perennial root; long, pinnated, ſawed leaves; upright, rough, uniflorous ſtalks, terminated by one deep red flower, ſucceeded by oval, ſmooth, capſules. The flowers appearing in May.

Propagation. All the kinds are hardy, and will proſper any where. The two firſt ſpecies being annual, are to be propagated only by ſeeds; but the two laſt by parting the roots as well as the ſeeds.

Uſes. The ſomniferous quality of the white poppy is well known. This quality reſides in the milky juice of the capſule containing the ſeeds, nor is it evaporated by drying the juice; hence the dried capſules are preſerved in the ſhops for making the ſyrup. The inſpiſſated juice itſelf is a kind of opium; and for an account of its virtues ſee the article Opium. The ſeeds alſo make a very agreeable emulſion, but have no ſoporific virtue.

PAPAW, or Papa-tree. See Carica.—This tree is male and female upon different roots: the flowers of the former are white, and of the latter yellowiſh. The tender buds of theſe laſt are preſerved into ſweetmeats; and the long mango-popo, which is ſaid to be little inferior to an Eaſt India mango, into pickles. When nearly ripe, the fruits are likewiſe boiled and eaten with any kind of fleſh-meat, care being taken previouſly to cleanſe them of the milky corroſive juice contained in them, which is of ſo penetrating a nature, ſays Hughes, that if the unripe fruit, when unpeeled, is boiled with the tougheſt old ſalt meat, it will ſoon make it ſoft and tender; and, if hogs are for any conſiderable time fed with the raw fruit, it wears off all the mucous ſlimy matter which covers the inſide of the guts; and would in time, if not prevented by a change of food, entirely lacerate them. This juice, according to Linnæus, is ſometimes made uſe of to cure ring-worms and ſuch cutaneous eruptions. It muſt be expelled by the medium of ſalt-water before the fruit is fit for uſe. It is remarkable, that the ſtalk of this plant is herbaceous and hollow; which laſt attribute has paſſed into a proverb in Barbadoes and other Weſt India iſlands, where it is common to characteriſe a diſſembler, by ſaying, that he is as hollow as a popo.

PAPER, ſheets of a thin matter, made of ſome vegetable ſubſtance.

The materials on which mankind have, in different ages, contrived to write their ſentiments, have been extremely various; in the early ages they made uſe of ſtones, and tables of wood, wax, ivory, &c. See BOOK.

Paper, with regard to the manner of making it, and the materials employed therein, is reducible to ſeveral kinds; as Egyptian paper, made of the ruſh papyrus; bark-paper, made of the inner rind of ſeveral trees; cotton-paper; incombuſtible paper; and European paper, made of linen rags.

Egyptian paper was principally uſed among the ancients; being made of the papyrus, or biblus, a ſpecies of ruſh which grew on the bank of the Nile. In making it into paper, they began with lopping off the two extremes of the plant, the head and the root; the remaining part, which was the ſtem, they cut lengthwiſe into two nearly equal parts, and from each of theſe they ſtripped the ſcaly pellicles of which it conſiſted. The innermoſt of theſe pellicles were looked on as the beſt, and that neareſt the rind as the worſt: they were therefore kept apart, and made to conſtitute two different ſorts of paper. As the pellicles were taken off, they extended them on a table, laying them over each other tranſverſely, ſo as that the fibres made right angles: in this ſtate they were glued together by the muddy waters of the Nile; or, when thoſe were not to be had, with paſte made of the fineſt wheat-flour, mixed with hot water and a ſprinkling of vinegar. The pellicles were next preſſed to get out the water, then dried, and laſtly flatted and ſmoothed by beating them with a mallet: this was the Egyptian paper, which was ſometimes farther poliſhed by rubbing it with a glaſs-ball, or the like.

Bark-paper was only the inner whitiſh rind, incloſed between the bark and the wood of ſeveral trees, as the maple, plane, beech, and elm; but eſpecially the tilia, or linden-tree, which was that moſtly uſed for this purpoſe. On this ſtripped off, flatted, and dried, the ancients wrote books, ſeveral of which are ſaid to be ſtill extant.

Chineſe paper is of various kinds. Some is made of the rinds or barks of trees, eſpecially the mulberry-tree and elm, but chiefly of the bamboo and cotton-tree. In fact, almoſt each province has its ſeveral paper. The preparations of paper made of the barks of trees, may be inſtanced in that of the bamboo, which is a tree of the cane or reed kind. The ſecond ſkin of the bark, which is ſoft and white, is ordinarily made uſe of for paper: this is beat in fair water to a pulp, which they take up in large moulds, ſo that ſome ſheets are above twelve feet in length; they are completed, by dipping them ſheet by ſheet in alum-water; which ſerves inſtead of the ſize among us, and not only hinders the paper from imbibing the ink, but makes it look as if varniſhed over. This paper is white, ſoft, and cloſe, without the leaſt roughneſs; though it cracks more eaſily than European paper, is very ſubject to be eaten by the worms, and its thinneſs makes it liable to be ſoon worn out.

Cotton-paper is a ſort of paper which has been in uſe upwards of 600 years. In the French king's library are manuſcripts on this paper, which appear to be of the 10th century; and from the 12th century, cotton manuſcripts are more frequent than parchment ones. Cotton-paper is ſtill made in the Eaſt Indies, by beating cotton-rags to a pulp.

Linen or European paper appears to have been firſt introduced among us towards the beginning of the 14th century; but by whom this valuable commodity was invented, is not known. The method of making paper of linen or hempen rags, is as follows: The linen-rags being carried to the mill, are firſt ſorted, then waſhed very clean in puncheons, whoſe ſides are grated with ſtrong wires, and the bottoms bored full of holes. After this they are fermented, by laying them in heaps cloſe covered with ſacking, till they ſweat and rot, which is commonly done in four or five days. When duly fermented, they are twiſted into handfuls, cut ſmall, and thrown into oval mortars, made of well-ſeaſoned oak, about half a yard deep, with an iron-plate at bottom, an inch thick, eight inches broad, and thirty long; in the middle is a waſhing-block, grooved, with five holes in it, and a piece of hair-ſieve faſtened on the inſide; this keeps the hammers from touching it, and prevents any thing going out except foul water. Theſe mortars are continually ſupplied with water, by little troughs from a ciſtern, fed by buckets fixed to the ſeveral floats of a great wheel, which raiſes the wooden hammers for pounding the rags in the mortars. When the rags are beaten to a certain degree, called the *firſt ſtuff*, the pulp is removed into boxes, made like corn-chandlers bins, with the bottom-board aſlant, and a little ſeparation on the front for the water to drain away. The pulp of the rags being in, they take away as many of the front-boards as are needful, and preſs the maſs hard down with their hands; the next day they put on another board, and add more pulp, till the box is full; and here it remains mellowing a week, more or leſs, according to the weather. After this, the ſtuff is again put into clean mortars, and is beaten afreſh, and removed into boxes, as before; in which ſtate it is called the *ſecond ſtuff.* The maſs is beat a third time, till ſome of it being mixed with fair water, and brewed to and fro, appears like flour and water, without any lumps in it: it is then fit for the pit-mortar, where it is perfectly diſſolved, and is then carried to the vat, to be formed into ſheets of paper. But lately, inſtead of pounding the rags to a pulp with large hammers, as above, they make uſe of an engine, which performs the work in much leſs time. This engine conſiſts of a round ſolid piece of wood, into which are faſtened ſeveral long pieces of ſteel, ground very ſharp. This is placed in a large trough with the rags, and a ſufficient quantity of water. At the bottom of the trough is a plate with ſteel bars, ground ſharp like the former; and the engine being carried round with prodigious velocity, reduces the rags to a pulp in a very ſhort time. It muſt be obſerved, that the motion of the engine cauſes the water in the trough to circulate, and by that means conſtantly returns the ſtuff to the engine. The trough is conſtantly fed with clean water at one end, while the dirty water from the rags is carried off at the other, through a hole, defended with wire gratings, in order to hinder the pulp from going out with the dirty water.

When the ſtuff is ſufficiently prepared as above, it is carried to the vat, and mixed with a proper quantity of water, which they call *priming the vat.* The vat is rightly primed, when the liquor has ſuch a proportion of the pulp, as that the mould, on being dipped into it, will juſt take up enough to make a ſheet of paper of the thickneſs required. The mould is a kind of ſieve exactly of the ſize of the paper to be made, and about an inch deep, the bottom being formed of fine braſs wire, guarded underneath with ſticks, to prevent it bagging down, and to keep it horizontal; and further, to ſtrengthen the bottom, there are large wires placed in parallel lines, at equal diſtances, which form thoſe lines viſible in all white paper when held up to the light: the mark of the paper is alſo made in this bottom, by interweaving a large wire in any particular form. This mould the maker dips into the liquor, and gives it a ſhake as he takes it out, to clear the water from the pulp. He then ſlides it along a groove to the coucher, who turns out the ſheet upon a felt laid on a plank, and lays another felt on it; and returns the mould to the maker, who by this time has prepared a ſecond ſheet in another mould: and thus they proceed, laying alternately a ſheet and a felt, till they have made ſix quires of paper, which is called a *poſt;* and this they do with ſuch ſwiftneſs, that, in many ſorts of paper, two men make 20 poſts and more in a day. A poſt of paper being made, either the maker or coucher whiſtles; on which four or five men advance, one of whom draws it under the preſs, and the reſt preſs it with great force, till all the water is ſqueezed from it; after which it is ſeparated ſheet by ſheet from the felts, and laid regularly one ſheet upon another; and having undergone a ſecond preſſing, it is hung up to dry. When ſufficiently dried, it is taken off the lines, rubbed ſmooth with the hands, and laid by till ſized; which is the next operation. For this they chooſe a fine temperate day; and having boiled a proper quantity of clean parchment, or vellum-ſhavings, in water, till it comes to a ſize, they prepare a fine cloth, on which they ſtrew a due proportion of white vitriol and roch alum finely powdered, and ſtrain the ſize through it into a large tub; in which they dip as much paper at once as they can conveniently hold, and with a quick motion give every ſheet its ſhare of the ſize, which muſt be as hot as the hand can well bear it. After this, the paper is preſſed, hung up ſheet by ſheet to dry; and being taken down is ſorted, and what is only fit for outſide-quires laid by themſelves: it is then told into quires, which are folded and preſſed. The broken ſheets are commonly put together, and two of the worſt quires are placed on the outſide of every ream or bundle: and being tied up in wrappers, made of the ſettling of the vat, it is fit for ſale.

Paper is of various kinds, and uſed for various purpoſes: with regard to colour, it is principally diſtinguiſhed into white, blue, and brown; and with regard to its dimenſions, into atlas, elephant, imperial, ſuper-royal, royal, medium, demy, crown, fools-cape, and pot-paper.

Mr Guettard of the Royal Academy of Sciences in France has given an account of a number of experiments on materials for making paper; with a view, if poſſible, to procure this uſeful ſubſtance from ſuch others as are always to be had in greater plenty than rags can be got; of which there is ſometimes a conſiderable ſcarcity. Mr Reaumur has obſerved, that waſps have a method of preparing bits of rotten wood whereby they build their neſts, in ſuch a manner, that it looks like ſtrong paper or paſteboard. Seba, in the firſt volume of his Natural Hiſtory, propoſes the alga marina. "This country (ſays he) does not ſeem to want trees fit for making paper, if people would give themſelves the neceſſary trouble and expence. Alga marina, for example, which is compoſed of long, ſtrong, viſcous filaments, might it not be proper for this purpoſe, as well as the matts of Muſcovy, if they were prepared as the Japaneſe make their paper? The curious may at leaſt try the experiment." P. du Halde, in the firſt volume of his Hiſtory of China, pretends, that the Chineſe make paper of the ſecond bark of bamboo, of the bark of different trees, particularly the mulberry, of ſtraw, rue, and hemp. Other authors mention its having been made of mallows, and ſeveral different kinds of herbs. All Mr Guettard's trials, however, proved unſucceſsful, and flax, cotton, hemp, and ſilk, ſeem to be the only materials of which it is poſſible to make this valuable commodity. The reaſon of theſe failures was, that the abovementioned ſubſtances only ſeem capable of being reduced to fibres indefinitely fine, and which at the ſame time preſerve a conſiderable degree of toughneſs; all others being very coarſe in the fibre itſelf, and ſoon reducible to their ultimate fineneſs; and what is worſe, the fibres are brittle, ſo that the paper when made has no coheſion. Our author, however, has found, that paper may be made from flax, hemp, and ſilk, without the trouble of manufacturing them into cloth; and therefore he recommends the dreſſings of the two former, which are ſometimes in ſuch abundance as to be thrown away; but if we conſider the great trouble which muſt be neceſſary to bring thoſe materials to a proper colour, and the great diminution of them which muſt neceſſarily enſue during the tedious operation, it is not probable that any advantage could be gained in this way.

Preparation of Paper *for durable writing.* For this purpoſe Dr Lewis recommends the impregnation of it with aſtringent materials. "It is obſervable (ſays he) that writings firſt begin to fade or change their colour on the back of the paper, where the larger ſtrokes have ſunk in, or are viſible through it; as if part of the irony matter of the vitriol was in a more ſubtile or diſſolved ſtate than the reſt, and ſunk further, on account of its not being fully diſengaged from the acid, or ſufficiently combined with the aſtringent matter of the galls. Hence, it ſhould ſeem probable, that if the paper was impregnated with aſtringent matter, the colour of the ink would be more durable. To ſee how far this notion was well founded, I dipt ſome paper in an infuſion of galls; and, when dry, repeated the dipping a ſecond and third time. On the paper thus prepared, and ſome that was unprepared, I wrote with different inks; ſeveral of which, that the effects might be more ſenſible, had an over-proportion of vitriol. The writings being expoſed to the weather till the beſt of the inks on the unprepared paper had faded and changed their colour, thoſe on the prepared paper were all found to retain their blackneſs. It is therefore recommended to the conſideration of the paper-makers, whether a particular kind of paper might not be prepared for thoſe uſes where the long duration of the writing is of principal importance, by impregnating it with galls or other aſtringents, in ſome of the operations it paſſes through before it receives the glazing; as for inſtance, by uſing an aſtringent infuſion, inſtead of common water, in the laſt operation, when the matter is reduced into a pulp for being formed into ſheets. The browniſh hue which the paper receives from the galling, would not perhaps be any great obſtacle to its uſe; and, if the propoſal ſhould be thought worthy of being carried into execution, further inquiries may poſſibly diſcover the means of obviating the imperfection, and communicating aſtringency without colour.

Staining or Colouring of Paper. The colours proper for paper are not different from thoſe uſed for other ſubſtances, and are enumerated under the article Colour-*Making*. They are applied with ſoft bruſhes, after being tempered to a due degree with ſize or gum water. If the paper on which they are to be laid is ſoft, ſo that the colours are apt to go through, it muſt alſo be ſized before they are laid on, or a proportionably larger quantity muſt be uſed along with the colours themſelves. If a conſiderable extent of the paper is to be done over with one colour, it muſt receive ſeveral coatings, as thin as poſſible, letting each coat dry before another is put on, otherwiſe the colour will be unequal.

To gild Paper. Take yellow oker, grind it with rain-water, and lay a ground with it upon the paper all over; when dry, take the white of eggs, beat it clear with white ſugar-candy, and ſtrike it all over: then lay on the leaf-gold; and, when dry, poliſh it with a tooth. Some take ſaffron, boil it in water, and diſſolve a little gum with it; then they ſtrike it over the paper, lay on the gold; and, when dry, they poliſh it.

To ſilver Paper, *after the Chineſe manner, without ſilver.* Take two ſcruples of clear glue made of neats leather, one ſcruple of white allum, and half a pint of clear water; ſimmer the whole over a ſlow fire, till the water is conſumed, or the ſteam ceaſes: Then, your ſheets of paper being laid on a ſmooth table, you dip a pretty large pencil into that glue, and daub it over as even as you can, repeating this two or three times: then ſift the powder of talc through a fine ſieve, made of horſe-hair or gauſe, over it; and then hang it up to dry; and, when dry, rub off the ſuperfluous talc, which ſerves again for the ſame purpoſe. The talc you prepare in the following manner: Take fine white tranſparent Muſcovy talc; boil it in clear water for four hours; then take it off the fire, and let it ſtand ſo for two days: then take it out, waſh it well, and put it into a linen-rag, and beat it to pieces with a mallet: to 10 pounds of talc add 3 pounds of white allum, and grind them together in a little hand-mill; ſift it through a gauze-ſieve; and being thus reduced to a powder, put it into water, and juſt boil it up: then let it ſink to the bottom, pour off the water from it, place the powder in the ſun to dry, and it will become a hard conſiſtence. This beat in a mortar to an impalpable powder, and keep it, for the uſe abovementioned, free from duſt.

Paper-*Hangings*, furniture now greatly uſed, and generally approved, as it is at once airy and cheap.

The paper manufactured for hangings is of ſeveral kinds, ſome being made in repreſentation of ſtucco work, for the covering cielings or the ſides of halls, ſtair-caſes, paſſages, &c. and others in imitation of velvet, damaſk, brocades, chints, or other ſuch ſilks and ſtuffs as are employed for hanging rooms. The principal difference in the manufacture lies, however, in the grounds: ſome of which are laid in varniſh, and others in the common vehicles for water-colours; and in the raiſing a kind of coloured emboſſment by chopt cloth, which is called *flock-paper*.

Unwrought Paper *proper for Hangings.*—The kind of paper employed for making the paper-hangings is a ſort of coarſe cartoon manufactured for this purpoſe; and there being a particular duty on paper-hangings, it is required, under conſiderable penalties, to be ſtamped before it be painted or otherwiſe decorated for this purpoſe. There is no occaſion, however, to be more particular in explaining the qualities of this kind of unwrought paper; becauſe it is to be had of all the great dealers in paper, manufactured in a proper manner

White and coloured Grounds for Paper-*Hangings.*—The common grounds laid in water are made by mixing whiting with the common glovers ſize, and laying it on the paper with a proper bruſh in the moſt even manner. This is all that is required, where the ground is to be left white; and the paper being then hung on a proper frame, till it be dry, is fit to be painted. When coloured grounds are required, the ſame method muſt be purſued, and the ground of whiting firſt laid; except in pale colours, ſuch as ſtraw-colours or pink, where a ſecond coating may ſometimes be ſpared, by mixing ſome ſtrong colour with the whiting.

Manner of painting the Paper-*Hangings.*—There are three methods by which paper-hangings are painted; the firſt by *printing* on the colours; the ſecond by uſing the *ſtencil*; and the third by laying them on with a *pencil*, as in other kinds of painting.

When the colours are laid on by printing, the impreſſion is made by wooden prints; which are cut in ſuch manner, that the figure to be expreſſed is made to project from the ſurface by cutting away all the other part; and this, being charged with the colours tempered with their proper vehicle, by letting it gently down on a block on which the colour is previouſly ſpread, conveys it from thence to the ground of the paper, on which it is made to fall more forcibly by means of its weight, and the effort of the arm of the perſon who uſes the print. It is eaſy to conclude, that there muſt be as many ſeparate prints as there are colours to be printed. But where there are more than one, great care muſt be taken, after the firſt, to let the print fall exactly in the ſame part of the paper as that which went before; otherwiſe the figure of the deſign would be brought into irregularity and confuſion. In common paper of low price, it is uſual, therefore, to print only the outlines, and lay on the reſt of the colours by ſtencilling; which both ſaves the expence of cutting more prints, and can be practiſed by common workmen, not requiring the great care and dexterity neceſſary to the uſing ſeveral prints.

The manner of *ſtencilling* the colours is this. The figure, which all the parts of any particular colour make in the deſign to be painted, is to be cut out, in a piece of thin leather or oil-cloth, which pieces of leather or oil-cloth, are called *ſtencils;* and being laid flat on the ſheets of paper to be printed, ſpread on a table or floor, are to be rubbed over with the colour, properly tempered, by means of a large bruſh. The colour paſſing over the whole is conſequently ſpread on thoſe parts of the paper where the cloth or leather is cut away, and give the ſame effect as if laid on by a print. This is nevertheleſs only practicable in parts where there are only detached maſſes or ſpots of colours: for where there are ſmall continued lines, or parts that run one into another, it is difficult to preſerve the connection or continuity of the parts of the cloth, or to keep the ſmaller corners cloſe down to the paper; and therefore, in ſuch caſes, prints are preferable. Stencilling is indeed a cheaper method of ridding coarſe work than printing: but, without ſuch extraordinary attention and trouble as render it equally difficult with printing, it is far leſs beautiful and exact in the effect. For the outline of the ſpots of colour want that ſharpneſs and regularity that are given by prints, beſides the frequent extralineations, or deviations from the juſt figure, which happens by the original miſplacing of the ſtencils, or the ſhifting the place of them during the operation.

Pencilling is only uſed in the caſe of nicer work, ſuch as the better imitations of the India paper. It is performed in the ſame manner as other paintings in water or varniſh. It is ſometimes uſed only to fill the outlines already formed by printing, where the price of the colour, or the exactneſs of the manner in which it is required to be laid on, render the ſtencilling or printing it leſs proper; at other times, it is uſed for forming or delineating ſome parts of the deſign, where a ſpirit of freedom and variety, not to be had in printed outlines, are deſired to be had in the work.

Management of the Flock PAPER.—The paper deſigned for receiving the flock is firſt prepared with a varniſh-ground with ſome proper colour, or by that of the paper itſelf. It is frequently practiſed to print ſome Moſaic, or other ſmall running figure in colours, on the ground, before the flock be laid on; and it may be done with any pigment of the colour deſired, tempered with varniſh, and laid on by a print cut correſpondently to that end.

The method of laying on the flock is this. A wooden print being cut, as is above deſcribed, for laying on the colour in ſuch manner, that the part of the deſign which is intended for the flock may project beyond the reſt of the ſurface, the varniſh is put on a block covered with leather or oil-cloth, and the print is to be uſed alſo in the ſame manner, to lay the varniſh on all the parts where the flock is to be fixed. The ſheet, thus prepared by the varniſhed impreſſion, is then to be removed to another block or table; and to be ſtrewed over with flock; which is afterwards to be gently compreſſed by a board, or ſome other flat body, to make the varniſh take the better hold of it: and then the ſheet is to be hung on a frame till the varniſh be perfectly dry; at which time the ſuperfluous part of flock is to be bruſhed off by a ſoft camel's-hair bruſh; and the proper flock will be found to adhere in a very ſtrong manner.

The method of preparing the flock is, by cutting woollen-rags, or pieces of cloth with the hand, by means of a large bill or chopping knife; or by means of a machine worked by a horſe-mill.

There is a kind of counterfeit flock-paper, which, when well managed, has very much the ſame effect to the eye as the real, though done with leſs expence. The manner of making this ſort is, by laying a ground of varniſh on the paper; and having afterwards printed the deſign of the flock in varniſh, in the ſame manner as for the true; inſtead of the flock, ſome pigment, or dry colour, of the ſame hue with the flock required by the deſign, but ſomewhat of a darker ſhade, being well powdered, is ſtrewed on the printed varniſh; and produces nearly the ſame appearance.

PAPER-*Money*, is a term frequently made uſe of for bank-bills, which paſs currently in trade inſtead of gold and ſilver.

Concerning this ſpecies of currency, the national utility of which has been controverted by ſome, we have the following obſervations in Dr Smith's Treatiſe on the Wealth of Nations: "The ſubſtitution of paper in the room of gold and ſilver money replaces a very expenſive inſtrument of commerce with one much leſs coſtly, and ſometimes equally convenient. Circulation comes to be carried on by a new wheel, which it coſts leſs both to erect and maintain than the old one.

"When the people of any particular country have ſuch confidence in the fortune, probity, and prudence of a particular banker, as to believe that he is always ready to pay upon demand ſuch of his promiſſory notes as are likely at any time to be preſented to him, thoſe notes come to have the ſame currency as gold and ſilver money, from the confidence that ſuch money can at any time be had for them.

"A particular banker lends among his cuſtomers his own promiſſory notes, to the amount, we ſhall ſuppoſe, of 100,000 l. As thoſe notes ſerve all the purpoſes of money, his debtors pay him the ſame intereſt as if he had lent them ſo much money. This intereſt is the ſource of his gain. Though ſome of thoſe notes are continually coming back upon him for payment, part of them continue to circulate for months and years together. Though he has generally in circulation, therefore, notes to the amount of 100,000 l. 20,000 l. in gold and ſilver may frequently be a ſufficient proviſion for anſwering occaſional demands. By this operation, therefore, 20,000 l. in gold and ſilver perform all the functions which 100,000 l. could otherwiſe have performed. Eighty thouſand pounds of gold and ſilver can therefore, in this manner, be ſpared from the circulation of the country; and if different operations of the ſame kind ſhould, at the ſame time, be carried on by many different banks and bankers, the whole circulation may be thus conducted with a fifth part only of the gold and ſilver.

“ Let us ſuppoſe, for example, that the whole circulating money of ſome particular country amounted, at a particular time, to 1,000,000 ſterling, that ſum being then ſufficient for circulating the whole annual produce of their land and labour. Let us ſuppoſe too, that, ſome time thereafter, different banks and bankers iſſued promiſſory notes, payable to the bearer, to the extent of 1,000,000, reſerving in their different coffers 200,000 l. for anſwering occaſional demands. There would remain, therefore, in circulation 800,000 l. in gold and ſilver, and 1,000,000 of bank-notes, or 1,800,000 l. of paper and money together. But the annual produce of the land and labour of the country had before required only 1,000,000 to circulate and diſtribute it to its proper conſumers, and that annual produce cannot be immediately augmented by thoſe operations of banking. One million, therefore, will be ſufficient to circulate it after them. The goods to be bought and ſold being preciſely the ſame as before, the ſame quantity of money will be ſufficient for buying and ſelling them. The channel of circulation, if I may be allowed ſuch an expreſſion, will remain preciſely the ſame as before. One million we have ſuppoſed ſufficient to fill that channel. Whatever, therefore, is poured into it beyond this ſum, cannot run in it, but muſt overflow. One million eight hundred thouſand pounds are poured into it. Eight hundred thouſand pounds, therefore, muſt overflow, that ſum being over and above what can be employed in the circulation of the country. But though this ſum cannot be employed at home, it is too valuable to be allowed to lie idle. It will therefore be ſent abroad, in order to ſeek that profitable employment which it cannot find at home. But the paper cannot go abroad; becauſe, at a diſtance from the banks which iſſue it, and from the country in which payment of it can be exacted by law, it will not be received in common payments. Gold and ſilver, therefore, to the amount of 800,000 l. will be ſent abroad, and the channel of home circulation will remain filled with 1,000,000 of paper, inſtead of 1,000,000 of thoſe metals which filled it before.

“ But though ſo great a quantity of gold and ſilver is thus ſent abroad, we muſt not imagine that it is ſent abroad for nothing, or that its proprietors make a preſent of it to foreign nations. They will exchange it for foreign goods of ſome kind or another, in order to ſupply the conſumption either of ſome other foreign country or of their own.

“ If they employ it in purchaſing goods in one foreign country in order to ſupply the conſumption of another, or in what is called the *carrying trade*, whatever profit they make will be an addition to the neat revenue of their own country. It is like a new fund, created for carrying on a new trade; domeſtic buſineſs being now tranſacted by paper, and the gold and ſilver being converted into a fund for this new trade.

“ If they employ it in purchaſing foreign goods for home-conſumption, they may either firſt purchaſe ſuch goods as are likely to be conſumed by idle people who produce nothing, ſuch as foreign wines, foreign ſilks, &c.; or, ſecondly, they may purchaſe an additional ſtock of materials, tools, and proviſions, in order to employ an additional number of induſtrious people, who re-produce, with a profit, the value of their annual conſumption.

“ So far as it is employed in the firſt way, it promotes prodigality, increaſes expence and conſumption, without increaſing production, or eſtabliſhing any permanent fund for ſupporting that expence, and is in every reſpect hurtful to the ſociety.

“ So far as it is employed in the ſecond way, it promotes induſtry; and though it increaſes the conſumption of the ſociety, it provides a permanent fund for ſupporting that conſumption, the people who conſume, re-producing, with a profit, the whole value of their annual conſumption. The groſs revenue of the ſociety, the annual produce of their land and labour, is increaſed by the whole value which the labour of thoſe workmen adds to the materials upon which they are employed; and their neat revenue by what remains of this value, after deducting what is neceſſary for ſupporting the tools and inſtruments of their trade.

“ That the greater part of the gold and ſilver which, being forced abroad by thoſe operations of banking, is employed in purchaſing foreign goods for home-conſumption, is and muſt be employed for purchaſing thoſe of this ſecond kind, ſeems not only probable, but almoſt unavoidable. Though ſome particular men may ſometimes increaſe their expence very conſiderably, though their revenue does not increaſe at all, we may be aſſured that no claſs or order of men ever does ſo; becauſe, though the principles of common prudence do not always govern the conduct of every individual, they always influence that of the majority of every claſs or order. But the revenue of idle people, conſidered as a claſs or order, cannot in the ſmalleſt degree be increaſed by thoſe operations of banking. Their expence in general, therefore, cannot be much increaſed by them, tho' that of a few individuals among them may, and in reality ſometimes is. The demand of idle people, therefore, for foreign goods, being the ſame, or very nearly the ſame, as before, a very ſmall part of the money, which being forced abroad by thoſe operations of banking, is employed in purchaſing foreign goods for home-conſumption, is likely to be employed in purchaſing thoſe for their uſe. The greater part of it will naturally be deſtined for the employment of induſtry, and not for the maintenance of idleneſs.

“ When we compute the quantity of induſtry which the circulating capital of any ſociety can employ, we muſt always have regard to thoſe parts of it only which conſiſt in proviſions, materials, and finiſhed work: the other, which conſiſts in money, and which ſerves only to circulate thoſe three, muſt always be deducted. In order to put induſtry into motion, three things are requiſite; materials to work upon, tools to work with, and the wages or recompence for the ſake of which the work is done. Money is neither a material to work upon, nor a tool to work with; and though the wages of the workman are commonly paid to him in money, his real revenue, like that of all other men, conſiſts, not in the money, but in the money's worth; not in the metal pieces, but in what can be got for them.

"The quantity of induſtry which any capital can employ, muſt evidently be equal to the number of workmen whom it can ſupply with materials, tools, and a maintenance ſuitable to the nature of the work. Money may be requiſite for purchaſing the materials and tools of the work, as well as the maintenance of the workmen. But the quantity of induſtry which the whole capital can employ, is certainly not equal both to the money which purchaſes, and to the materials, tools, and maintenance, which are purchaſed with it; but only to one or other of thoſe two values, and to the latter more properly than to the former.

"When paper is ſubſtituted in the room of gold and ſilver money, the quantity of the materials, tools, and maintenance, which the whole circulating capital can ſupply, may be increaſed by the whole value of gold and ſilver which uſed to be employed in purchaſing them. The whole value of the great wheel of circulation and diſtribution is added to the goods which are circulated and diſtributed by means of it. The operation, in ſome meaſure, reſembles that of the undertaker of ſome great work, who, in conſequence of ſome improvement in mechanics, takes down his old machinery, and adds the difference between its price and that of the new to his circulating capital, to the fund from which he furniſhes materials and wages to his workmen.

"What the proportion is which the circulating money of any country bears to the whole value of the annual produce circulated by means of it, it is perhaps impoſſible to determine. It has been computed by different authors at a fifth, at a tenth, at a twentieth, and at a thirtieth part of that value. But how ſmall ſoever the proportion which the circulating money may bear to the whole value of the annual produce, as but a part, and frequently but a ſmall part, of that produce, is ever deſtined for the maintenance of induſtry, it muſt always bear a very conſiderable proportion to that part. When, therefore, by the ſubſtitution of paper, the gold and ſilver neceſſary for circulation is reduced to perhaps a fifth part of the former quantity, if the value of only the greater part of the other four-fifths be added to the funds which are deſtined for the maintenance of induſtry, it muſt make a very conſiderable addition to the quantity of that induſtry, and conſequently to the value of the annual produce of land and labour.

"An operation of this kind has, within theſe 25 or 30 years, been performed in Scotland, by the erection of new banking companies in almoſt every conſiderable town, and even in ſome country villages. The effects of it have been preciſely thoſe above deſcribed. The buſineſs of the country is almoſt entirely carried on by means of the paper of thoſe different banking companies, with which purchaſes and payments of all kinds are commonly made. Silver very ſeldom appears, except in the change of a twenty ſhillings bank-note, and gold ſtill ſeldomer. But though the conduct of all thoſe different companies has not been unexceptionable, and has accordingly required an act of parliament to regulate it; the country, notwithſtanding, has evidently derived great benefit from their trade. I have heard it aſſerted, that the trade of the city of Glaſgow doubled in about 15 years after the firſt erection of the banks there; and that the trade of Scotland has more than quadrupled ſince the firſt erection of the two public banks at Edinburgh; of which the one, called *The Bank of Scotland*, was eſtabliſhed by act of parliament in 1695, the other, called *The Royal Bank*, by royal charter in 1727. Whether the trade, either of Scotland in general, or of the city of Glaſgow in particular, has really increaſed in ſo great a proportion during ſo ſhort a period, I do not pretend to know. If either of them has increaſed in this proportion, it ſeems to be an effect too great to be accounted for by the ſole operation of this cauſe. That the trade and induſtry of Scotland, however, have increaſed very conſiderably during this period, and that the banks have contributed a good deal to this increaſe, cannot be doubted.

"The value of the ſilver money which circulated in Scotland before the Union, in 1707, and which immediately after it was brought into the bank of Scotland in order to be re-coined, amounted to 411,117l. 10s. 9d. ſterling. No account has been got of the gold coin; but it appears from the ancient accounts of the mint of Scotland, that the value of the gold annually coined ſomewhat exceeded that of the ſilver. There were a good many people too upon this occaſion, who, from a diffidence of repayment, did not bring their ſilver into the bank of Scotland; and there was, beſides, ſome Engliſh coin which was not called in. The whole value of the gold and ſilver, therefore, which circulated in Scotland before the Union, cannot be eſtimated at leſs than 1,000,000 ſterling. It ſeems to have conſtituted almoſt the whole circulation of that country; for though the circulation of the bank of Scotland, which had then no rival, was conſiderable, it ſeems to have made but a very ſmall part of the whole. In the preſent times, the whole circulation of Scotland cannot be eſtimated at leſs than 2,000,000, of which that part which conſiſts in gold and ſilver moſt probably does not amount to 500,000. But though the circulating gold and ſilver of Scotland have ſuffered ſo great a diminution during this period, its real riches and proſperity do not appear to have ſuffered any. Its agriculture, manufactures, and trade, on the contrary, the annual produce of its land and labour, have evidently been augmented."

PAPER-*Office*, an office in the palace of Whitehall, in which all the public writings, matters of ſtate and council, proclamations, letters, intelligences, negociations abroad, and generally all diſpatches that paſs through the offices of the ſecretaries of ſtate, are lodged, by way of library.

PAPIER-MACHE. This is a ſubſtance made of cuttings of white or brown papier, boiled in water, and beaten in a mortar, till they are reduced into a kind of paſte, and then boiled with a ſolution of gum arabic or of ſize, to give tenacity to the paſte, which is afterwards formed into different toys, &c. by preſſing it into oiled moulds. When dry, it is done over with a mixture of ſize and lamp-black, and afterwards varniſhed. The black varniſh for theſe toys, according to Dr Lewis, is prepared as follows: Some colophony, or turpentine boiled down till it becomes black and friable, is melted in a glazed earthen veſſel, and thrice as much amber in fine powder ſprinkled in by degrees, with the addition of a little ſpirit or oil of turpentine now and then: when the amber is melted, ſprinkle in the ſame quantity of ſarcocolla, continuing to ſtir them, and to add more ſpirit of turpentine, till the whole becomes fluid; then ſtrain out the clear through a coarſe hair-bag, preſſing it gently between hot boards. This varniſh, mixed with ivory-black in fine powder, is applied, in a hot room, on the dried paper-paſte; which is then ſet in a gently heated oven, next day in a hotter oven, and the third day in a very hot one, and let ſtand each time till the oven grows cold. The paſte thus varniſhed is hard, durable, gloſſy, and bears liquors hot or cold.

PAPHLAGONIA (anc. geog.) a country of the Hither Aſia, beginning at Parthenius, a river of Bethynia, on the weſt, and extending in length to the Halys eaſtward, with the Euxine to the north, and Galatia to the ſouth. Pliny enlarges the limits on the weſt ſide to the river Billis, on this ſide the Parthenius. It is called *Pylæmenia* by ſome, (Pliny). *Paphlagones*, the people, mentioned by Homer, and therefore of no ſmall antiquity. A ſuperſtitious and ſilly people, (Lucian); a brave people, (Homer); taking their name from Phaleg, (Bochart).

PAPHOS (anc. geog.) two adjoining iſlands on the weſt ſide of the iſland of Cyprus; the one called *Palæ Paphos*, (Strabo, Ptolemy, Pliny); the other *Nea Paphos*; and when mentioned without an adjunct, this latter is always underſtood. Both dedicated to Venus, and left undiſtinguiſhed by the poets, (Virgil, Horace). Hence Venus is ſurnamed *Paphia*; *Paphii* the people, (Coins, Stephanus). It was reſtored by Auguſtus, after a ſhock of an earthquake, and called *Auguſta*, (Dio).

PAPIAS, biſhop of Hieropolis, a city of Phrygia, was the diſciple of St John the Evangeliſt, and the companion of Polycarp, as St Jerome obſerves, and not of John the Ancient, as ſome other authors have maintained. He compoſed a work in five books, intitled *Expoſitions of the Diſcourſes of our Lord*, of which there are only ſome fragments now remaining. He it was who introduced the opinion of the Millenarians.

PAPILIO, the BUTTERFLY; in zoology, a genus of inſects belonging to the order of lepidoptera. It has four wings, imbricated with a kind of downy ſcales; the tongue is convoluted in a ſpiral form; and the body is hairy. There are 273 ſpecies, principally diſtinguiſhed by the colour of their wings.

The world is well acquainted with the beauties of this part of the animal-creation; but Mr Reaumur has given accounts of ſome very ſingular ſpecies, which deſerve a peculiar regard.

One ſpecies of theſe he has called the *bundle of dry leaves*. This, when it is in a ſtate of reſt, has wholly the appearance of a little cluſter of the decayed leaves of ſome herb. The poſition and colour of its wings greatly favour this reſemblance, and they have very large ribs; wholly like thoſe of the leaves of plants, and are indented in the ſame manner at their edges as the leaves of many plants are. This ſeems to point out the care of nature for the animal, and frequently may preſerve it from birds, &c.

The ſkull butterfly is another ſingular ſpecies, ſo called from its head reſembling, in ſome degree, a death's head, or human ſkull. This very remarkable appearance is terrible to many people; but it has another yet greater ſingularity attending it, which is, that, when frighted, it has a mournful and harſh voice. This appeared the more ſurpriſing to Mr Reaumur, as no other known butterfly had any the leaſt voice at all; and he was not ready of belief that it was a real voice, but ſuſpected the noiſe, like that of the cicadæ, to be owing to the attrition of ſome part of the body; and, in fine, he, by great pains, diſcovered that this noiſe was not truly vocal, but was made by a hard and briſk rubbing of the trunk againſt two other hard bodies between which it is placed.

Another butterfly there is, ſo ſmall that it might be miſtaken for a ſmall fly. This is certainly the extreme in degree of ſize of all the known butterflies, and cannot but have been proportionably ſmall in the ſtate of a caterpillar and chryſalis: this creature ſpends its whole life in all the three ſtages of caterpillar, chryſalis, and butterfly, on the leaf of the celandine. It lives on the under ſide of the leaf; and though in the caterpillar ſtate it feeds on it, yet it does no damage. It does not eat the ſubſtance of the leaf, but draws from it only a fine juice, which is ſoon repaired again, without occaſioning any change in the appearance of the leaf. This ſpecies is very ſhort-lived; and paſſes through its three ſtates in ſo ſhort a time, that there are frequently ten generations of it in one year; whereas, in all the other butterflies, two generations in the year are all that are to be had. Theſe two generations are ſufficient to make a prodigious increaſe: in a large garden, if there are twenty caterpillars in ſpring, theſe may be overlooked, and there may be eaſily concluded to be none there, even on a narrow ſearch; but if theſe twenty caterpillars afterwards become twenty butterflies, ten of which are male and ten female, and each female lay the ſame number of eggs that the common ſilk-worm does, that is, four hundred; if all the caterpillars hatched of theſe become butterflies, and theſe lay eggs in the ſame proportion, which remain the winter, and come to be hatched in the ſucceeding ſpring; then from theſe twenty, in only one year, you will have eight hundred thouſand; and if we add to this the increaſe of theſe in a ſucceeding year, the account muſt appear terrible, and ſuch as no art could guard againſt. The great ruler of the world has put ſo many hindrances in the way of this over-abundant production, that it is very rare ſuch years of deſtruction happen. Some ſuch have happened, however; and much miſchief has been dreaded from them, not only from their eating all the herbage, but from themſelves being eaten with herbs in ſallads and otherwiſe: but experiments have proven this an erroneous opinion, and they are found to be innocent, and eatable as ſnails or oyſters.

PAPILIONACEOUS, among botaniſts, an appellation given to the flowers of plants belonging principally to the diabelohia claſs, from their reſembling the wings of a butterfly.

PAPINIAN, a celebrated Roman lawyer of the third century, under the emperor Severus; who had ſo high an opinion of his worth, that he recommended his ſons Caracalla and Geta to his care. Caracalla having firſt murdered his brother, ordered Papinian to compoſe a diſcourſe to excuſe this murder to the ſenate and people; which when he refuſed to undertake, the brutal emperor ordered him to be beheaded; and his body was dragged through the ſtreets of Rome. Papinian wrote ſeveral treatiſes in the line of his profeſſion.

PAPISTS, are thoſe who profeſs the Popiſh religion in this kingdom; concerning whom there have been many ſtatutes ſince the Reformation. See NONCONFORMISTS.

PAPPUS, in botany, a ſoft downy ſubſtance that grows on the ſeeds of certain plants, as thiſtles, hawkweed, &c. ſerving to ſcatter and buoy them up in the air.

PAPPUS, an eminent philoſopher of Alexandria, ſaid by Suidas to have flouriſhed under the emperor Theodoſius the Great, who reigned from A. D. 379 to 395. His writings ſhew him to have been a conſummate mathematician: Many of them are loſt; the reſt continued long in manuſcript, detached parts having only been occaſionally publiſhed in the laſt century, until Carolus Manoleſſius publiſhed his remains entire at Bologna in 1660, in folio.

PAPYRUS, called alſo *Cyperus Niliacus*, the plant from which the Egyptians were in uſe to make their paper. It is a large plant that grows wild in the midſt of the ſtagnating water left in hollow places after the inundation of the Nile. We are told by Theophraſtus and Pliny, that the natives uſed the root of it for firing, as well as for other purpoſes of wood: that they built little boats of the plant itſelf; and formed the inner bark into ſails, garments, coverlids, and cordage; that they chewed it both raw and ſodden, and ſwallowed the juice as a dainty: but, of all its uſes, the moſt celebrated was that of its ſerving to write upon, like the paper of theſe days, which derives its name from this plant of Egypt. The intermediate part of the ſtalk was cut and ſeparated into different laminæ, which were ſet apart, and dried in the ſun for the manufacture. Theſe laminæ were joined together horizontally and tranſverſely, in ſheets or leaves, upon a ſmooth board; then moiſtened with water, which diſſolved a kind of viſcous glue in the pores of the plant, ſerving to cement and render the whole uniform. The ſheet being thus formed, was put into a preſs, and afterwards dried for uſe. Such was the proceſs of making paper in Egypt: but as the ſheets were coarſe, brown, unequal, and imperfect, the Romans invented methods to bring the fabric to perfection. They contrived a glue or gum, by means of which they could occaſionally enlarge the ſize and volume. They bleached it to a ſurpriſing degree of whiteneſs: they beat it with hammers, ſo as to render it more thin and leſs porous: they ſmoothed and poliſhed it with ivory; and by a ſort of calendar gave it a ſhining gloſs like that of the Chineſe paper. According to the different degrees of delicacy, whiteneſs, and ſize, it acquired different appellations, either from the names of particular manufactures, from the great perſonages who uſed it, or from the particular uſes to which it was put; ſuch as the *Fannian*, the *Leviathan*, the *Claudian*, the *Imperial*, the *Hieratic*, and the *Amphitheatric*.

PAR, in commerce, ſignifies any two things equal in value. See EXCHANGE.

PARABLE, a fable or allegorical inſtruction, founded on ſomething real or apparent in nature or hiſtory, from which a moral is drawn by comparing it with ſomething in which the people are more immediately concerned; ſuch are the parables of Dives and Lazarus, of the Prodigal Son, of the Ten Virgins, &c.

PARABOLA. See CONIC SECTIONS.

PARABOLE. See ORATORY, n° 84.

PARACELSUS, (Aurelius Philip Theophraſtus Bombaſtus de Hohenheim), a famous phyſician, born at Einſidlen, a town in the canton of Schweitz in Swiſſerland. He was educated with great care by his father, who was the natural ſon of a prince, and in a little time made a great progreſs in the ſtudy of phyſic. He afterwards travelled into France, Spain, Italy, and Germany, in order to become acquainted with the moſt celebrated phyſicians. At his return to Swiſſerland, he ſtopped at Bazil, where he read lectures on phyſic in the German tongue. He was one of the firſt who made uſe of chemical remedies with ſucceſs, by which he acquired a very great reputation. Paracelſus gloried in deſtroying the method eſtabliſhed by Galen, which he believed to be very uncertain; and by this means drew upon himſelf the hatred of the other phyſicians. It is ſaid, that he boaſted of being able by his remedies to preſerve the life of man for ſeveral ages: but he himſelf experienced the vanity of his promiſes, by his dying at Saltzburg, in 1504, at 37 years of age, according to ſome, and at 48, according to others. The beſt edition of his works is that of Geneva in 1658, in 3 vols folio.

PARACENTESIS, an operation in ſurgery, commonly called *Tapping*. See SURGERY.

PARACLET, the COMFORTER, a name given to the Holy Ghoſt.

PARADE, in a military ſenſe, the place where troops aſſemble or draw together to mount guard, or for any other purpoſe.

PARADE, in fencing, implies the action of parrying or turning off any thruſt.

PARADISE, a term principally uſed for the garden of Eden, in which Adam and Eve were placed immediately upon their creation.

As to this terreſtrial paradiſe, there have been many inquiries about its ſituation. It has been placed in the third heaven, in the orb of the moon, in the moon itſelf, in the middle region of the air, above the earth, under the earth, in the place poſſeſſed by the Caſpian ſea, and under the arctic pole. The learned Huetius places it upon the river that is produced by the conjunction of the Tigris and Euphrates, now called the *river of the Arabs*, between this conjunction and the diviſion made by the ſame river before it falls into the Perſian ſea. Other geographers have placed it in Armenia, between the ſources of the Tigris, the Euphrates, the Araxis, and the Phaſis, which they ſuppoſe to be the four rivers deſcribed by Moſes. But concerning the exact place we muſt neceſſarily be very uncertain, if indeed it can be thought at all to exiſt at preſent, conſidering the many changes which have taken place on the ſurface of the earth ſince the creation.

The celeſtial paradiſe is that place of pure and refined delight in which the ſouls of the bleſſed enjoy everlaſting happineſs.

Bird of Paradise. See the following article.

See Plate CCXXXIII

PARADISEA, in ornithology, a genus of birds belonging to the order of picæ. The beak is covered with a belt or collar of downy feathers at the baſe; and the feathers on the ſides are very long. The Portugueſe firſt found theſe birds on the iſland of Gilolo, the Papua iſlands, and New Guinea; and they were known by the name of *birds of the ſun*. The inhabitants of Ternate call them *manuco dewata*, the "bird of God;" whence the name *manuco diata*, uſed by ſome naturaliſts, is derived. According to ſome fabulous accounts, this bird has no legs, lives conſtantly on wing, and in the air; and, in confirmation of theſe accounts, the legs of all the dead birds offered to ſale were cut off. But the inhabitants of Aroo, who reſort yearly to Banda, undeceived the Dutch, and freed them from thoſe prejudices. Another reaſon for cutting off the legs is, that the birds are more eaſily preſerved without them; beſides that the Moors wanted the birds without legs, in order to put them on in their mock-fights as ornaments to their helmets. The inhabitants of Aroo, however, have brought the birds with legs for 70 or 80 years; and Pijafetta, ſhipmate of Ferdinand Magellan, proved, about the year 1525, an eye-witneſs that theſe creatures were not without legs. However, the peculiar length and ſtructure of their ſcapular feathers hinders them from ſettling, in high winds, on trees; and when they are thrown on the ground by theſe winds, they cannot riſe again. If taken by the natives, they are immediately killed, as their food is not known; and they defend themſelves with great courage with their formidable bills. There are reckoned ſix ſpecies of theſe birds.

Forreſt's Voyage to New Guinea.

1. The largeſt bird of Paradiſe is commonly two foot four inches in length; the head is ſmall; the bill hard and long, of a pale colour. The head and back-part of the neck is lemon-coloured, a little black about the eyes; about the neck, the bird is of the brighteſt gloſſy emerald green, ſoft like velvet; as is alſo the breaſt, which is black: the wings are large, and cheſnut-coloured; the back-part of the body is covered with long, ſtraight, narrow feathers, of a pale brown colour, ſimilar to the plumes of the oſtrich. Theſe feathers are ſpread when the bird is on the wing; for which reaſon he can keep very long in the air. On both ſides of the belly are two tufts of ſtiff and ſhorter feathers, of a golden yellow, and ſhining. From the rump proceed two long ſtiff ſhafts, which are feathered on their extremities.

Theſe birds are not found in Key, an iſland fifty Dutch miles eaſt of Banda; but they are found at the Aroo iſlands, lying 15 Dutch miles farther eaſt than Key, during the weſterly or dry monſoon; and they return to New Guinea as ſoon as the eaſterly or wet monſoon ſets in. They come always in a flock of 30 or 40, and are led by a bird which the inhabitants of Aroo call the *king*. This leader is black, with red ſpots; and conſtantly flies higher than the reſt of the flock, which never forſake him, but ſettle as ſoon as he ſettles: a circumſtance that frequently proves their ruin when the king lights on the ground, whence they are not able to riſe on account of the ſingular ſtructure and diſpoſition of their plumage. They are likewiſe unable to fly with the wind, which would ruin their looſe plumage; but take their flight conſtantly againſt it, cautious not to venture out in hard blowing weather, as a ſtrong wind frequently obliges them to come to the ground. During their flight they cry like ſtarlings. Their note, however, approaches more to the croaking of ravens; which is heard very plainly, when they are in diſtreſs from a freſh gale blowing on the back of their plumage. In Aroo, theſe birds ſettle on the higheſt trees, eſpecially on the ficus benjamina of the hortus malabaricus, commonly called the *waringa tree*. The natives catch them with bird-lime or in nooſes, or ſhoot them with blunt arrows; but though ſome are ſtill alive when they fall into their hands, the catchers kill them immediately, and ſometimes cut the legs off; then they draw out the entrails, dry and fumigate the bodies with ſulphur or ſmoke only, and ſell them at Banda for half a rixdollar each; but at Aroo they may be bought for a ſpike-nail or a piece of old iron. Flocks of theſe birds are often ſeen flying from one iſland to the other againſt the wind. In caſe they find the wind become too powerful, they fly ſtraight up into the air, till they come to a place where it is leſs agitated, and then continue their flight. During the eaſtern monſoon their tails are moulted, ſo that they have them only during four months of the weſtern monſoon.

2. The ſmaller bird of Paradiſe is about 20 inches long. His beak is lead-coloured, and paler at the point. The eyes are ſmall, and incloſed in black about the neck. The head and back of the neck are of a dirty yellow; the back of a greyiſh yellow; the breaſt and belly of a duſky colour; the wings ſmall, and cheſnut-coloured. The long plumage is about a foot in length, and paler than in the large ſpecies; as in general the colours of this bird are leſs bright than the former. The two long feathers of the tail are conſtantly thrown away by the natives.—This is in all reſpects like the greater ſort; and they likewiſe follow a king or leader, who is, however, blacker, with a purpliſh caſt, and finer in colour than the reſt. The neck and bill are larger in the male than in the female. They rooſt on the tops of the higheſt trees, and do not migrate like the other kind. Some ſay, that the birds of this ſpecies, finding themſelves weak through age, ſoar ſtraight towards the ſun till they are tired, and fall dead to the ground. The natives draw the entrails, ſear the birds with a hot iron, and put them in a tube of bamboo for preſervation.

3. and 4. The large black bird of Paradiſe is brought without wings or legs for ſale; ſo that no accurate deſcription of it hath yet been given. Its figure, when ſtuffed, is narrow and round, but ſtretched in length to the extent of four ſpans. The plumage on the neck, head, and belly, is black and velvet-like, with a hue of purple and gold, which appears very ſtrong. The bill is blackiſh, and one inch in length. On both ſides are two bunches of feathers, which have the appearance of wings, although

they be very different, the wings being cut off by the natives. This plumage is ſoft, broad, ſimilar to peacocks feathers, with a glorious gloſs and greeniſh hue, and all bent upwards; which Valentine thinks is occaſioned by the birds being kept in hollow bamboo reeds. The feathers of the tail are of unequal length; thoſe next to the belly are narrow, like hair; the two uppermoſt are much longer, and pointed; thoſe immediately under them are a ſpan and a half longer than the upper ones; they are ſtiff, on both ſides fringed with a plumage like hair, black above, but gloſſy below. Birds of this kind are brought only from one particular place of New Guinea. Beſides the large black bird of Paradiſe, there is ſtill another ſort, whoſe plumage is equal in length, but thinner in body, black above, and without any remarkable gloſs, not having thoſe ſhining peacock-feathers which are found on the greater ſpecies. This wants likewiſe the three long-pointed feathers of the tail belonging to the larger black ſpecies.

5. The white bird of Paradiſe is the moſt rare, and has two varieties; one quite white, and the other black and white. The former is very rare. The ſecond has the fore-part black, and the back-part white; with 12 crooked wiry ſhafts, which are almoſt naked, tho', in ſome places, covered with hairs.

6. In the year 1689, a new ſpecies of the black bird of Paradiſe was ſeen in Amboyna. This was only one foot in length, with a fine purple hue, a ſmall head, and a ſtraight bill. On its back, near the wings, are feathers of a blue and purple colour, as on the other birds of paradiſe; but under the wings, and over all the belly, they are yellow-coloured, as in the common ſort: on the back of the neck they are mouſe-coloured mixed with green. It is remarkable in this ſpecies, that there are before the wings two roundiſh tufts of feathers, which are green-edged, and may be moved at pleaſure by the bird, like wings. Inſtead of a tail, he has 12 or 13 black, naked, wire-like ſhafts, hanging promiſcuouſly like feathers. His legs are ſtrong, and have ſharp claws. The head is remarkably ſmall; and the eyes are alſo ſmall, and ſurrounded with black.

7. The laſt ſpecies is the king's bird. This creature is about ſeven inches long, and ſomewhat larger than a titmouſe. Its head and eyes are ſmall; the bill ſtraight; the eyes included in circles of black plumage; the crown of the head is flame-coloured; the back of the neck blood-coloured; the neck and breaſt of a cheſnut colour, with a ring of the brighteſt emerald-green. Its wings are in proportion ſtrong; and the quill-feathers dark, with red ſhining plumes, ſpots, and ſtripes. The tail is ſtraight, ſhort, and brown. Two long naked black ſhafts project from the rump, at leaſt a hand-breadth beyond the tail; having at their extremities ſemilunar twiſted plumage, of the moſt glaring green colour above, and duſky below. The belly is white and green ſprinkled; and on each ſide is a tuft of long plumage, feathered with a broad margin, being on one ſide green, and on the other duſky. The back is blood-red and brown, ſhining like ſilk. The legs are in ſize like thoſe of a lark, three fore-toes, and one back-toe. This bird aſſociates not with any of the other birds of paradiſe; but flits ſolitary from buſh to buſh, wherever he ſees red berries, without ever getting on tall trees.

PARADOX, in philoſophy, a propoſition ſeemingly abſurd, as being contrary to ſome received opinions, but yet true in fact.

No ſcience abounds more with paradoxes than geometry: thus, that a right line ſhould continually approach to the hyperbola, and yet never reach it, is a true paradox; and in the ſame manner a ſpiral may continually approach to a point, and yet not reach it in any number of revolutions, however great.

PARAGOGE, in grammar, a figure whereby a letter or ſyllable is added to the end of a word; as *med*, for *me; dicier*, for *dici*, &c.

PARAGRAPH, in general, denotes a ſection or diviſion of a chapter; and in references is marked thus, ¶.

PARAGUAY, or La Plata, a province of Spaniſh America, bounded on the north by the river of the Amazons; on the eaſt, by Braſil; on the ſouth, by Patagonia; and on the weſt, by Chili. This country was firſt diſcovered by Sebaſtian Cabot, who, in 1526, paſſed from Rio de la Plata to the river Parana in ſmall barks, and thence entered the river called *Paraguay*. It was not, however, thoroughly reduced till the Jeſuits obtained poſſeſſion of it. A few of theſe went to Paraguay, ſoon after the city of Aſſumption was founded, and converted about 50 Indian families, who ſoon induced many others to follow their example, on account of the peace and tranquillity they enjoyed under the fathers. They had long reſiſted the Spaniards and Portugueſe; but the Jeſuits, by learning their language, conforming to their manners, &c. ſoon acquired great authority among them; till at laſt, by ſteadily purſuing the ſame artful meaſures, they arrived at the higheſt degree of power and influence, being in a manner the abſolute ſovereigns of a great part of this extenſive country; for above 350,000 families are ſaid to have been ſubject to them, living in obedience and awe bordering on adoration, yet procured without the leaſt violence or conſtraint. There were above 60,000 pariſhes on the banks of the rivers Paraguay and Paraná, not exceeding the diſtance of 30 miles from each other: in each of theſe there was a Jeſuit, ſupreme in all cauſes, civil, military, and eccleſiaſtic, who might be regarded as a petty prince, governing not only with the ſway of a ſovereign, but with the influence and reputation of an oracle. He nominated the chiefs in all the different departments: the cacique held of him; the general received his commiſſion and inſtructions from him; and all his deciſions were without appeal. The ſame reverend father who preſided over the civil œconomy, aſſiſted by two others, performed alſo the duties of a pariſh-prieſt; catechiſing the Indians, ſaying maſs, exhorting, marrying, impoſing penance, viſiting the ſick, &c.

The above was the account given of the behaviour of the Jeſuits by their own writers. Others, however, treated their characters with more ſeverity; accuſing them of pride, haughtineſs, and abuſing their authority to the greateſt degree; inſomuch that they would have cauſed the magiſtrates to be whipped in their preſence, and obliged perſons of the higheſt diſtinction within their juriſdiction to kiſs the hem of their garment, as the greateſt honour at which they could poſſibly arrive. To this might be added, the utter abolition of all ideas of property; which indeed was rendered uſeleſs by the general magazines and ſtore-houſes which they eſtabliſhed, and from which, together with the herds of cattle kept for the public uſe, they ſupplied the want of individuals as occaſion required; yet ſtill it was objected to the character of the fraternity, that they poſſeſſed large property themſelves, and claimed the abſolute diſpoſal of the meaneſt effects in Paraguay. All manufactures belonged to them; every natural commodity was brought to them; and the treaſures annually remitted to the ſuperior of the order were thought to be a proof that zeal for religion was not the only motive by which they were influenced.

Beſides the parochial or provincial governments, there was a kind of ſupreme council, compoſed of an annual meeting of all the fathers, who concerted the meaſures neceſſary for promoting the common concerns of the miſſion, framed new laws, corrected or aboliſhed old ones, and, in a word, adapted eveay thing to circumſtances. It is ſaid to have been one of the great objects of the annual councils to take ſuch meaſures as ſhould effectually deprive ſtrangers of all intelligence concerning the ſtate of the miſſion. Hence the natives were reſtrained from learning the Spaniſh tongue, and were taught, that it was dangerous for their ſalvation to hold any converſation with a ſubject of Spain or Portugal. But the circumſtance that renrendered their deſigns moſt ſuſpicious, was the eſtabliſhment of a military force. Every pariſh had its corps of horſe and foot, who were duly exerciſed every Sunday; and it was ſaid, that the whole amounted to a body of 70,000 or 80,000 troops, well diſciplined.—Such was the ſtate of this country ſome time ago; but as to its ſituation ſince the abolition of the ſect of Jeſuits, we can ſay nothing, as very little authentic intelligence is permitted to paſs from that country to this.

The climate of Paraguay is very little different from that of Spain; and the diſtinctions between the ſeaſons are much the ſame. In winter indeed, violent tempeſts of wind and rain are very frequent, accompanied with ſuch dreadful claps of thunder and lightning as fill the inhabitants, though uſed to them, with terror and conſternation. In ſummer, the exceſſive heats are mitigated by gentle breezes, which conſtantly begin at eight or nine in the morning.

The ſoil is very fertile, producing maiz, manioc, and potatoes, beſides many fruits and ſimples unknown in Europe. Vines, however, do not thrive, except in ſome particular places. Wheat has alſo been tried; but it is only uſed for cakes, and other things of that kind. There are great numbers of poiſonous ſerpents, and others of an enormous ſize, many of which live on fiſh. Almoſt every foreſt of the country abounds with bees, which make their hives in hollow trees. The country produces alſo cotton, hemp, and flax; and there are ſuch numbers of wild cattle, that they are killed only for their hides. The natives differ not much from thoſe deſcribed under the article AMERICA.

PARALIPOMENA, in matters of literature, denotes a ſupplement of things omitted in a preceding work.

PARALEPSIS. See ORATORY, n° 87.

PARALLACTIC, in general, ſomething relating to the parallax of heavenly bodies. See PARALLAX.

PARALLAX, in aſtronomy. See there, n° 182, &c.

PARALLEL, in geometry, an appellation given to lines, ſurfaces, and bodies every where equidiſtant from each other. See GEOMETRY.

PARALLEL *Sphere*, that ſituation of the ſphere wherein the equator coincides with the horizon, and the poles with the zenith and nadir.

PARALLEL *Sailing*. See NAVIGATION, ſect. iii.

PARALLELS *of Latitude*, in aſtronomy, are leſſer circles of the ſphere parallel to the ecliptic, imagined to paſs through every degree and minute of the colures.

PARALLELS *of Altitude*, or *Almucantars*, are circles parallel to the horizon, imagined to paſs through every degree and minute of the meridian between the horizon and zenith, having their poles in the zenith.

PARALLELS *of Declination*, in aſtronomy, are the ſame with parallels of latitude in geography.

PARALLELLOPIPED, in geometry, a regular ſolid comprehended under ſix parallellograms, the oppoſite ones whereof are ſimilar, parallel, and equal to each other.

PARALLELLOPIPEDIA, in natural hiſtory, a genus of ſpars, externally of a determinate and regular figure, always found looſe, detached, and ſeparate from all other bodies, and in form of an oblique parallellopiped, with ſix parallellogram ſides and eight ſolid angles; eaſily fiſſile either in an horizontal or perpendicular direction; being compoſed of numbers of thin plates, and thoſe very elegantly and regularly arranged bodies, each of the ſame form with the whole maſs, except that they are thinner in proportion to their horizontal planes, and naturally fall into theſe and no other figures, on being broken with a ſlight blow.

PARALOGISM, in logic, a falſe reaſoning, or a fault committed in demonſtration, when a conſequence is drawn from principles that are falſe; or, though true, are not proved; or when a propoſition is paſſed over that ſhould have been proved by the way.

PARALYSIS, the PALSY. See MEDICINE, n° 376.

PARAMECIA, in natural hiſtory, a name given to ſuch animalcules as have no viſible limbs or tails, and are of an irregularly oblong figure.

PARAMOUNT, (compounded of two French words, *par*, i. e. *per*, and *monter aſcendere*), ſignifies in our law the "higheſt lord of the fee, of lands, tenements, and hereditaments." As there may be a lord meſne where lands are held of an inferior lord, who holds them of a ſuperior under certain ſervices; ſo this ſuperior lord is lord *paramount*. Alſo the king is the chief lord, or lord *paramount* of all the lands in the kingdom. *Co. Lit.* 1.

PARANYMPH, among the ancients, the perſon who waited on the bridegroom, and directed the nuptial ſolemnities; called alſo *pronubus* and *auſpex*, becauſe the ceremonies began by taking auſpicia. As the paranymph officiated only on the part of the bridegroom, a woman called *pronuba* officiated on the part of the bride.

PARAPET, in fortification, an elevation of earth deſigned for covering the ſoldiers from the enemy's cannon or ſmall-ſhot. See FORTIFICATION.

PARAPHERNALIA, or PARAPHERNA, in the civil law, thoſe goods which a wife brings her huſband beſides her dower, and which are ſtill to remain at her diſpoſal excluſive of her huſband, unleſs there are ſome proviſion made to the contrary in the marriage-contract. Some of our Engliſh civilians define the paraphernalia to be ſuch goods as a wife challengeth over and above her dower or jointure, after her huſband's death; as furniture for her chamber, wearing apparel, and jewels, which are not to be put into the inventory of her huſband's goods; and a French civilian calls paraphernalia the moveables, linen, and other female neceſſaries, which are adjudged to a wife in prejudice of the creditors, when ſhe renounces the ſucceſſion of her huſband.

PARAPHIMOSIS, a diſorder of the penis, wherein the prepuce is ſhrunk, and withdrawn behind the glans, ſo as not to be capable of being brought to cover the ſame; which generally happens in venereal diſorders. See SURGERY.

PARAPHRASE, an explanation of ſome text in clearer and more ample terms, whereby is ſupplied what the author might have ſaid or thought on the ſubject. Such are eſteemed Eraſmus's paraphraſe on the New Teſtament, the Chaldee Paraphraſe on the Pentateuch, &c.

PARAPHRENITIS, an inflammation of the diaphragm. See MEDICINE, n° 290.

PARAPHROSYNE, a word uſed by medical writers to denote a delirium, or an alienation of mind in fevers, or from whatever other cauſe.

PARAPLEGIA, a ſpecies of palſy. See MEDICINE, n° 379.

PARASANG, an ancient Perſian meaſure, different at different times, and in different places; being uſually 30, ſometimes 40, and ſometimes 50 ſtadia, or furlongs.—The word, according to Littleton, has its riſe from *paraſch angarius, q. d.* the ſpace a poſt-man rides from one ſtation, *angaria,* to another.

PARASELENE, in natural philoſophy, a mock moon; a meteor or phenomenon encompaſſing or adjacent to the moon, in form of a luminous ring; wherein are obſerved ſometimes one, and ſometimes two or more images of the moon.

PARASITE, among the Greeks, was originally a very reputable title; the paraſites being a kind of prieſts, at leaſt miniſters, of the gods, in the ſame manner as the epulones were at Rome. They took care of the ſacred corn, or the corn deſtined for the ſervice of the temples and the gods, *viz.* ſacrifices, feaſts, &c. They had even the intendance over ſacrifices; and took care that they were duly performed. At Athens there was a kind of college of 12 paraſites; each people of Attica furniſhing one, who was always choſen out of the beſt families. Polybius adds, that a paraſite was alſo an honourable title among the ancient Gauls, and was given to their poets. But of late it has been made a term of reproach, and uſed for a flatterer or mean dependent.

PARASITES, or PARASITICAL *Plants*, in botany, ſuch plants as are produced out of the trunk or branches of other plants, from whence they receive their nouriſhment, and will not grow on the ground. Such are the miſletoe, &c.

PARASTATÆ, in anatomy. See PROSTATE.

PARBUNCLE, in a ſhip, the name of a rope almoſt like a pair of ſlings: it is ſeized both ends together, and then put almoſt double about any heavy thing that is to be hoiſted in or out of the ſhip; having the hook of the runner hitched into it, to hoiſt it up by.

PARCÆ, in heathen mythology, goddeſſes who were ſuppoſed to preſide over the accidents and events, and to determine the date or period of human life.

The Parcæ were three, Clotho, Lacheſis, and Atropos; becauſe, forſooth, all things have their beginning, progreſs, and end. Hence the poets tell us, the Parcæ ſpun the thread of mens lives; that Clotho held the diſtaff, and drew the thread; Lacheſis twirled the ſpindle, and ſpun it; and Atropos cut it. *Clotho colum retinet, Lacheſis net, Atropos occat.*

The ancients repreſent the Parcæ divers ways: Lucian, in the ſhape of three poor old women, having large locks of wool, mixed with daffodils on their heads; one of which holds a diſtaff, the other a wheel, and the third a pair of ſciſſars, wherewith to cut the thread of life.—Others repreſent them otherwiſe: Clotho appearing in a long robe of divers colours, wearing a crown upon her head adorned with ſeven ſtars, and holding a diſtaff in her hand; Lacheſis in a robe beſet with ſtars, with ſeveral ſpindles in her hand; and Atropos, clad in black, cutting the thread with a pair of large ſciſſars.

The ancients imagined that the Parcæ uſed white wool for a long and happy life, and black for a ſhort and unfortunate one.

PARCHMENT, the ſkins of ſheep or goats prepared after ſuch a manner as to render it proper for writing upon, covering books, &c.

The word comes from the Latin *pergamena*, the ancient name of this manufacture; which is ſaid to have been taken from the city Pergamos, to Eumenes, king whereof, its invention is uſually aſcribed; tho', in reality, that prince appears rather to have been the improver, than the inventor of parchment. For the Perſians of old, according to Diodorus, wrote all their records on ſkins; and the ancient Ionians, as we are told by Herodotus, made uſe of ſheep-ſkins and goat-ſkins in writing, many ages before Eumenes's time. Nor need we doubt that ſuch ſkins were prepared and dreſſed for that purpoſe, after a manner not unlike that of our parchment; tho' probably not ſo artificially.—The manufacture of parchment is begun by the ſkinner, and finiſhed by the parchment-maker.

The ſkin having been ſtripped of its wool, and placed in the lime-pit, in the manner deſcribed under the article SHAMMY, the ſkinner ſtretches it on a kind of frame, and pares off the fleſh with an iron inſtrument; this done, it is moiſtened with a rag; and powdered chalk being ſpread over it, the ſkinner takes a large pumice-ſtone, flat at bottom, and rubs over the ſkin, and thus ſcowers off the fleſh; he then goes over it again with the iron inſtrument, moiſtens it as before, and rubs it again with the pumice-ſtone without any chalk underneath: this ſmooths and ſoftens the fleſh-ſide very conſiderably. He then drains it again, by paſſing over it the iron inſtrument as before. The fleſh-ſide being thus drained, by ſcraping off the moiſture, he in the ſame manner paſſes the iron over the wool or hair-ſide: then ſtretches it tight on a frame, and ſcrapes the fleſh-ſide again: this finiſhes its draining; and the more it is drained, the whiter it becomes. The ſkinner now throws on more chalk, ſweeping it over with a piece of lamb-ſkin that has the wool on; and this ſmooths it ſtill farther. It is now left to dry, and when dried, taken off the frame by cutting it all round. The ſkin thus far prepared by the ſkinner, is taken out of his hands by the parchment-maker, who firſt, while it is dry, pares it on a ſummer, (which is a calf-ſkin ſtretched in a frame), with a ſharper inſtrument than that uſed by the ſkinner; and working with the arm from the top to the bottom of the ſkin, takes away about one half of its thickneſs. The ſkin thus equally pared on the fleſh-ſide, is again rendered ſmooth, by being rubbed with the pumice-ſtone, on a bench covered with a ſack ſtuffed with flocks; which leaves the parchment in a condition fit for writing upon. The parings thus taken off the leather, are uſed in making glue, ſize, &c. See the article GLUE, &c.

What is called *vellum*, is only parchment made of the ſkins of abortives, or at leaſt ſucking calves. This has a much finer grain, and is whiter and ſmoother than parchment; but is prepared in the ſame manner, except its not being paſſed through the lime-pit.

PARDIES (Ignatius Gaſton), an ingenious and learned French Jeſuit, born at Paris in 1636. He taught polite literature for ſeveral years; during which time he compoſed ſeveral ſmall pieces, both in proſe and verſe, with peculiar delicacy of thought and ſtyle. At length he devoted himſelf entirely to mathematics and natural philoſophy, and read all authors, ancient as well as modern, in thoſe branches of knowledge. He died in 1673, of an infectious diſorder contracted by confeſſing and preaching to the priſoners in the Bicetre during the Eaſter holidays. Father Pardies publiſhed ſeveral works; of which his Elements of Geometry are well known in this country, where a tranſlation of them has gone thro' ſeveral editions. In 1672 he had a diſpute with Sir Iſaac Newton reſpecting his Theory of Light and Colours; which may be ſeen in the Philoſophical Tranſactions for that year.

PARDALIS, in natural hiſtory. See LEO.

PARDON, in criminal law, is the remitting or forgiving an offence committed againſt the king.

Beccaria on Crimes and Puniſhments

Laws (ſays an able writer), cannot be framed on principles of compaſſion to guilt; yet juſtice, by the conſtitution of England, is bound to be adminiſtered in mercy: this is promiſed by the king in his coronation oath; and it is that act of his government which is the moſt perſonal and moſt entirely his own. The king condemns no man; that rugged taſk he leaves to his courts of juſtice: the great operation of his ſceptre is mercy. His power of pardoning was ſaid by our Saxon anceſtors to be derived *à lege ſuæ dignitatis*: and it is declared in parliament, by ſtat. 27 Hen. VIII. c. 24. that no other perſon hath power to pardon or remit any treaſon or felonies whatſoever; but that the king hath the whole and ſole power thereof, united and knit to the imperial crown of this realm.

This is indeed one of the great advantages of monarchy in general above any other form of government, that there is a magiſtrate who has it in his power to extend mercy wherever he thinks it is deſerved; holding a court of equity in his own breaſt, to ſoften the rigour of the general law, in ſuch criminal caſes as merit an exemption from puniſhment. Pardons (according to ſome theoriſts) ſhould be excluded in a perfect legiſlation, where puniſhments are mild, but certain; for that the clemency of the prince ſeems a tacit diſapprobation of the laws. But the excluſion of pardons muſt neceſſarily introduce a very dangerous power in the judge or jury; that of conſtruing the criminal law by the ſpirit inſtead of the letter: or elſe it muſt be holden, what no man will ſeriouſly avow, that the ſituation and circumſtances of the offender (though they alter not the eſſence of the crime) ought to make no diſtinction in the puniſhment. In democracies, however, this power of pardon can never ſubſiſt; for there nothing higher is acknowledged than the magiſtrate who adminiſters the laws: and it would be impolitic for the power of judging and of pardoning to centre in one and the ſame perſon. This (as the preſident Monteſquieu obſerves) would oblige him very often to contradict himſelf, to make and to unmake his deciſions: it would tend to confound all ideas of right among the maſs of people; as they would find it difficult to tell, whether a priſoner were diſcharged by his innocence, or obtained a pardon through favour. In Holland therefore, if there be no ſtadtholder, there is no power of pardoning lodged in any other member of the ſtate. But in monarchies the king acts in a ſuperior ſphere; and though he regulates the whole government as the firſt mover, yet he does not appear in any of the diſagreeable or invidious parts of it. Whenever the nation ſee him perſonally engaged, it is only in works of legiſlature, magnificence, or compaſſion. To him therefore the people look up as the fountain of nothing but bounty and grace; and theſe repeated acts of goodneſs, coming immediately from his own hand, endear the ſovereign to his ſubjects, and contribute more than any thing to root in their hearts that filial affection and perſonal loyalty which are the ſure eſtabliſhment of a prince.

The king may pardon all offences merely againſt the crown or the public; excepting, 1. That, to preſerve the liberty of the ſubject, the committing any man to priſon out of the realm, is by the *habeas corpus* act, 31 Car. II. c. 2. made a *præmunire*, unpardonable even by the king. Nor, 2. can the king pardon, where private juſtice is principally concerned in the proſecution of offenders: *Non poteſt rex gratiam facere cum injuria et damno aliorum.* Therefore, in appeals of all kinds, (which are the ſuit, not of the king, but of the party injured), the proſecutor may releaſe; but the king cannot pardon. Neither can he pardon a common nuiſance, while it remains unredreſſed, or ſo as to prevent an abatement of it; though afterwards he may remit the fine: becauſe though the proſecution is veſted in the king to avoid the multiplicity of ſuits, yet (during its continuance) this offence ſavours more of the nature of a *private* injury to each individual in the neighbourhood, than of a *public* wrong. Neither, laſtly, can the king pardon an offence againſt a popular or penal ſtatute, after information brought; for thereby the informer hath acquired a private property in his part of the penalty.

There is alſo a reſtriction of a peculiar nature, that affects the prerogative of pardoning, in caſe of parliamentary impeachments, viz. that the king's pardon cannot be pleaded to any ſuch impeachment, ſo as to impede the inquiry, and ſtop the proſecution of great and notorious offenders. Therefore when, in the reign of Charles the ſecond, the earl of Danby was impeached by the houſe of commons of high treaſon and other miſdemeſnors, and pleaded the king's pardon in bar of the ſame, the commons alleged, “That there was no precedent that ever any pardon was granted to any perſon impeached by the commons of high treaſon, or other high crimes, depending the impeachment;” and thereupon reſolved, “That the pardon ſo pleaded was illegal and void, and ought not to be allowed in bar of the impeachment of the commons of England:” for which reſolution they aſſigned this reaſon to the houſe of lords, “That the ſetting up a pardon to be a bar of an impeachment defeats the whole uſe and effect of impeachments: for ſhould this point be admitted, or ſtand doubted, it would totally diſcourage the exhibiting any for the future; whereby the chief inſtitution for the preſervation of the government would be deſtroyed.” Soon after the Revolution, the commons renewed the ſame claim, and voted, “That a pardon is not pleadable in bar of an impeachment.” And at length, it was enacted by the act of ſettlement, 12 & 13 W. III. c. 2. “That no pardon under the great ſeal of England ſhall be pleadable to an impeachment by the commons in parliament.” But, after the impeachment has been ſolemnly heard and determined, it is not underſtood that the king's royal grace is farther reſtrained or abridged: for, after the impeachment and attainder of the ſix rebel lords in 1715, three of them were from time to time reprieved by the crown; and at length received the benefit of the king's moſt gracious pardon.

The effect of ſuch pardon by the king, is to make the offender a new man; to acquit him of all corporal penalties and forfeitures annexed to that offence for which he obtains his pardon; and not ſo much to reſtore his former, as to give him a new credit and capacity. But nothing can reſtore or purify the blood when once corrupted, if the pardon be not allowed till after attainder, but the high and tranſcendent power of parliament. Yet if a perſon attainted receives the king's pardon, and afterwards hath a ſon, that ſon may be heir to his father; becauſe the father being made a new man, might tranſmit new inheritable blood; though, had he been born before the pardon, he could never have inherited at all.

PAREGORIES, in pharmacy, medicines that aſſuage pain, otherwiſe called ANODYNES.

PAREIRA FRAVA, in the materia medica, a kind of oblong and large root brought from the Braſils.—It is certainly a diuretic of no mean character, and has done great ſervice in nephritic caſes. In pleuriſies and quinſies, it has been attended with more ſucceſs than almoſt any medicine we know of ſingly.

PARELCON, in grammar, a figure by which a word or ſyllable is added to the end of another.

PAREMBOLE, in rhetoric, a figure wherein ſomething relating to the ſubject is inſerted in the middle of a period. All the differences between the parembole and parentheſis, according to Voſſius, is, that the former relates to the ſubject in hand, whereas the latter is foreign to it.

PARENCHYMA, in anatomy, a term introduced by Eraſiſtratus, ſignifying all that ſubſtance which is contained in the interſtices betwixt the blood-veſſels of the viſcera, which he imagined to be extravaſated and concreted blood.

PARENCHYMA *of Plants*. Grew applies the term *parenchyma* to the pith or pulp, or that inner part of a fruit or plant through which the juice is ſuppoſed to be diſtributed. See PLANTS.

PARENT, a term of relation applicable to thoſe from whom we immediately derive our being. See MORAL PHILOSOPHY, n° 122, 132,—135.

To this article belongs an inquiry into, 1. The legal duties of parents to their legitimate children. 2. Their power over them.

I. The duties of parents to legitimate children conſiſt in three particulars; their *maintenance*, their *protection*, and their *education*.

Blackſt. Comment.

1. The duty of parents to provide for the *maintenance* of their children, is a principle of natural law; an obligation, ſays Puffendorff, laid on them not only by nature herſelf, but by their own proper act, in bringing them into the world; for they would be in the higheſt manner injurious to their iſſue, if they only gave their children life, that they might afterwards ſee them periſh. By begetting them, therefore, they have entered into a voluntary obligation, to endeavour, as far as in them lies, that the life which they have beſtowed ſhall be ſupported and preſerved. And thus the children will have a perfect right of receiving maintenance from their parents. And the preſident Monteſquieu has a very juſt obſervation upon this head, that the eſtabliſhment of marriage, in all civilized ſtates, is built on this natural obligation of the father to provide for his children; for that aſcertains and makes known the perſon who is bound to fulfil this obligation; whereas, in promiſcuous and illicit conjunctions, the father is unknown; and the mother finds a thouſand obſtacles in her way; ſhame, remorſe, the conſtraint of her ſex, and the rigour of laws, that ſtifle her inclinations to perform this duty; and beſides, ſhe generally wants ability.

The municipal laws of all well-regulated ſtates have taken care to enforce this duty: though providence has done it more effectually than any laws, by implanting in the breaſt of every parent that natural ϛοργη, or inſuperable degree of affection, which not even the deformity of perſon or mind, not even the wickedneſs, ingratitude, and rebellion of children, can totally ſuppreſs or extinguiſh.

The civil law obliges the parent to provide maintenance for his child; and if he refuſes, *judex de ea re cognoſcet*. Nay, it carries this matter ſo far, that it will not ſuffer a parent at his death totally to diſinherit his child, without expreſsly giving his reaſon for ſo doing; and there are 14 ſuch reaſons reckoned up, which may juſtify ſuch diſinheriſon. If the parent alleged no reaſon, or a bad, or a falſe one, the child might ſet the will aſide, *tanquam teſtamentum inofficioſum*, a teſtament contrary to the natural duty of the parent. And it is remarkable under what colour the children were to move for relief in ſuch a caſe; by ſuggeſting, that the parent had loſt the uſe of his reaſon when he made the *inofficious* teſtament. And this, as Puffendorff obſerves, was not to bring into diſpute the teſtator's power of diſinheriting his own offspring; but to examine the motives upon which he did it; and if they were found defective in reaſon, then to ſet them aſide. But perhaps this is going rather too far: every man has, or ought to have, by the laws of ſociety, a power over his own property: and, as Grotius very well diſtinguiſhes, natural right obliges to give a *neceſſary* maintenance to children; but what is more than that they have no right to, than as it is given by the favour of their parents, or the poſitive conſtitutions of the municipal law.

Let us next ſee what proviſion our own laws have made for this natural duty. It is a principle of law, that there is an obligation on every man to provide for thoſe deſcended from his loins; and the manner in which this obligation ſhall be performed, is thus pointed out. The father and mother, grandfather and grandmother of poor impotent perſons ſhall maintain them at their own charges, if of ſufficient ability, according as the quarter-ſeſſions ſhall direct; and, if a parent runs away, and leaves his children, the churchwardens and overſeers of the pariſh ſhall ſeize his rents, goods, and chattels, and diſpoſe of them toward their relief. By the interpretations which the courts of law have made upon theſe ſtatutes, if a mother or grandmother marries again, and was before ſuch ſecond marriage of ſufficient ability to keep the child, the huſband ſhall be charged to maintain it; for this being a debt of her's, when ſingle, ſhall, like others, extend to charge the huſband. But, at her death, the relation being diſſolved, the huſband is under no farther obligation.

No perſon is bound to provide a maintenance for his iſſue, unleſs where the children are impotent and unable to work, either through infancy, diſeaſe, or accident; and then is only obliged to find them with neceſſaries, the penalty on refuſal being no more than 20 s. a-month. For the policy of our laws, which are ever watchful to promote induſtry, did not mean to compel a father to maintain his idle and lazy children in eaſe and indolence; but thought it unjuſt to oblige the parent, againſt his will, to provide them with ſuperfluities, and other indulgences of fortune; imagining they might truſt to the impulſe of nature, if the children were deſerving of ſuch favours. Yet, as nothing is ſo apt to ſtifle the calls of nature as religious bigotry, it is enacted, that if any Popiſh parent ſhall refuſe to allow his Proteſtant child a fitting maintenance, with a view to compel him to change his religion, the lord chancellor ſhall by order of court conſtrain him to do what is juſt and reaſonable. But this did not extend to perſons of another religion, of no leſs bitterneſs and bigotry than the Popiſh: and therefore, in the very next year, we find an inſtance of a Jew of immenſe riches, whoſe only daughter having embraced Chriſtianity, he turned her out of doors; and on her application for relief, it was held ſhe was entitled to none. But this gave occaſion to another ſtatute, which ordains, that if Jewiſh parents refuſe to allow their Proteſtant children a fitting maintenance, ſuitable to the fortune of the parent, the lord chancellor, on complaint, may make ſuch order therein as he ſhall ſee proper.

Our law has made no proviſion to prevent the diſinheriting of children by will; leaving every man's property in his own diſpoſal, upon a principle of liberty in this as well as every other action; though perhaps it had not been amiſs if the parent had been bound to leave them at the leaſt a neceſſary ſubſiſtence. Indeed, among perſons of any rank or fortune, a competence is generally provided for younger children, and the bulk of the eſtate ſettled upon the eldeſt by the marriage-articles. Heirs alſo, and children, are favourites of our courts of juſtice, and cannot be diſinherited by any dubious or ambiguous words; there being required the utmoſt certainty of the teſtator's intentions to take away the right of an heir.

2. From the duty of maintenance we may eaſily paſs to that of *protection*; which is alſo a natural duty, but rather permitted than enjoined by any municipal laws; nature, in this reſpect, working ſo ſtrongly as to need rather a check than a ſpur. A parent may, by our laws, maintain and uphold his children in their law-ſuits, without being guilty of the legal crime of maintaining quarrels. A parent may alſo juſtify an aſſault and battery in defence of the perſons of his children; nay, where a man's ſon was beaten by another boy, and the father went near a mile to find him, and there revenged his ſon's quarrel by beating the other boy, of which beating he afterwards unfortunately died; it was not held to be murder, but manſlaughter merely. Such indulgence does the law ſhew to the frailty of human nature, and the workings of parental affection.

3. The laſt duty of parents to their children is that of giving them an *education* ſuitable to their ſtation in life: a duty pointed out by reaſon, and of far the greateſt importance of any. For, as Puffendorff very well obſerves, it is not eaſy to imagine or allow, that a parent has conferred any conſiderable benefit upon his child by bringing him into the world, if he afterwards entirely neglects his culture and education, and ſuffers him to grow up like a mere beaſt, to lead a life uſeleſs to others, and ſhameful to himſelf. Yet the municipal laws of moſt countries ſeem to be defective in this point, by not conſtraining the parent to beſtow a proper education upon his children. Perhaps they thought it puniſhment enough to leave the parent, who neglects the inſtruction of his family, to labour under thoſe griefs and inconveniencies which his family, ſo uninſtructed, will be ſure to bring upon him. Our laws, though their defects in this particular cannot be denied, have in one inſtance made a wiſe proviſion for breeding up the riſing generation; ſince the poor and laborious part of the community, when paſt the age of nurture, are taken out of the hands of their parents, by the ſtatutes for apprenticing poor children; and are placed out by the public in ſuch a manner as may render their abilities, in their ſeveral ſtations, of the greateſt advantage to the commonwealth. The rich indeed are left at their own option, whether they will breed up their children to be ornaments or diſgraces to their family. Yet in one caſe, that of religion, they are under peculiar reſtrictions: for it is provided, that if any perſon ſends any child under his government beyond the ſeas, either to prevent its good education in England, or in order to enter into, or reſide in, any Popiſh college, or to be inſtructed, perſuaded, or ſtrengthened in the Popiſh religion; in ſuch caſe, beſides the diſabilities incurred by the child ſo ſent, the parent or perſon ſending ſhall forfeit 100 *l.* which ſhall go to the ſole uſe and benefit of him that ſhall diſcover the offence. And if any parent, or other, ſhall ſend

or convey any perſon beyond ſea, to enter into, or be reſident in, or trained up in, any priory, abbey, nunnery, Popiſh univerſity, college, or ſchool, or houſe of Jeſuits or prieſts, or in any private Popiſh family, in order to be inſtructed, perſuaded, or confirmed, in the Popiſh religion; or ſhall contribute any thing towards their maintenance when abroad by any pretext whatever, the perſon both ſending and ſent ſhall be diſabled to ſue in law or equity, or to be executor or adminiſtrator to any perſon, or to enjoy any legacy or deed of gift, or to bear any office in the realm, and ſhall forfeit all his goods and chattels, and likewiſe all his real eſtate for life.

II. The *power* of parents over their children is derived from the former conſideration, their *duty*: this authority being given them, partly to enable the parent more effectually to perform his duty, and partly as a recompence for his care and trouble in the faithful diſcharge of it. And upon this ſcore the municipal laws of ſome nations have given a much larger authority to the parents than others. The ancient Roman laws gave the father a power of life and death over his children; upon this principle, that he who gave had alſo the power of taking away. But the rigour of theſe laws was ſoftened by ſubſequent conſtitutions; ſo that we find a father baniſhed by the emperor Hadrian for killing his ſon, though he had committed a very heinous crime, upon this maxim, that *patria poteſtas in pietate debet, non in atrocitate, conſiſtere.* But ſtill they maintained to the laſt a very large and abſolute authority: for a ſon could not acquire any property of his own during the life of his father; but all his acquiſitions belonged to the father, or at leaſt the profits of them, for his life.

The power of a parent by our Engliſh law is much more moderate; but ſtill ſufficient to keep the child in order and obedience. He may lawfully correct his child, being under age, in a reaſonable manner; for this is for the benefit of his education. The conſent or concurrence of the parent to the marriage of his child under age, was alſo directed by our ancient law to be obtained: but now it is abſolutely neceſſary; for without it the contract is void. And this alſo is another means which the law has put into the parent's hands, in order the better to diſcharge his duty; firſt, of protecting his children from the ſnares of artful and deſigning perſons; and next, of ſettling them properly in life, by preventing the ill conſequences of too early and precipitate marriages. A father has no other power over his ſon's eſtate, than as his truſtee or guardian; for though he may receive the profits during the child's minority, yet he muſt account for them when he comes of age. He may indeed have the benefit of his children's labour while they live with him, and are maintained by him; but this is no more than he is entitled to from his apprentices or ſervants. The legal power of a father, (for a mother, as ſuch, is entitled to no power, but only to reverence and reſpect), the power of a father, we ſay, over the perſons of his children ceaſes at the age of 21; for they are then enfranchiſed by arriving at years of diſcretion, or that point which the law has eſtabliſhed (as ſome muſt neceſſarily be eſtabliſhed) when the empire of the father, or other guardian, gives place to the empire of reaſon. Yet, till that age arrives, this empire of the father continues even after his death; for he may by his will appoint a guardian to his children. He may alſo delegate part of his parental authority, during his life, to the tutor or ſchoolmaſter of his child; who is then *in loco parentis*, and has ſuch a portion of the power of the parent committed to his charge, *viz.* that of reſtraint and correction, as may be neceſſary to anſwer the purpoſes for which he is employed. See Children.

PARENTALIA, in antiquity, funeral obſequies, or the laſt duties paid by children to their deceaſed parents.

PARENTHESIS, in grammar, certain intercalary words inſerted in a diſcourſe, which interrupt the ſenſe or thread, but ſeem neceſſary for the better underſtanding of the ſubject.

PARENZO, a ſmall but ſtrong town of Italy, and in Iſtria, with a biſhop's ſee and a good harbour; ſeated on the gulph of Venice, in E. Long. 13. 46. N. Lat. 39. 28. It ſubmitted to the Venetians in 1267.

PARESIS, in medicine, a palſy of the bladder, wherein the urine is either ſuppreſſed or diſcharged involuntarily.

PARETONIUM, in natural hiſtory, the name of an earth found on the ſhores of Egypt, Cyrene, and the iſland of Crete, uſed by the ancients in painting.

PARGET, in natural hiſtory, a name given to ſeveral kinds of gypſum, or plaſter-ſtone.

PARGETING, in building, is uſed for the plaſtering of walls, and ſometimes for plaſter itſelf.

PARHELION, or Parhelium, in natural philoſophy, a mock-ſun or meteor, in form of a very bright light, appearing on one ſide of the ſun.

Appearances of this kind have been made mention of both by the ancients and moderns. Ariſtotle obſerves, that in general they are ſeen only when the ſun is near the horizon, though he takes notice of two that were ſeen in Boſphorus from morning to evening; and Pliny has related the times when ſuch phenomena were obſerved at Rome. Gaſſendi ſays, that, in 1635 and 1636, he often ſaw one mock-ſun. Two were obſerved by M. de la Hire in 1689; and the ſame number by Caſſini in 1693, Mr Grey in 1700, and Dr Halley in 1702: but the moſt celebrated appearances of this kind were ſeen at Rome by Scheiner, by Muſchenbroeck at Utrecht, and by Hevelius at Sedan. By the two former, four mock-ſuns were obſerved, and by the latter ſeven.

Parhelia are apparently of the ſame ſize with the ſun, though not always of the ſame brightneſs, nor even of the ſame ſhape; and when a number appear at once, there is ſome difference in both theſe reſpects among them. Externally, they are tinged with colours like the rainbow; and many have a long fiery tail oppoſite to the ſun, but paler towards the extremity. Parhelia are generally accompanied with corona's, ſome of which are tinged with rainbow-colours, but others are white. They differ in number and ſize; but all agree in breadth, which is that of the apparent diameter of the ſun.

A very large white circle, parallel to the horizon, generally paſſes through all the parhelia; and, if it were entire, it would go through the centre of the ſun. Sometimes there are arcs of leſſer circles concentric to this, touching thoſe coloured circles which ſurround the ſun. They are alſo tinged with colours, and contain other parhelia. There are alſo ſaid to have been other circles obliquely ſituated with reſpect to all thoſe we have mentioned; but of this we have met with no authentic account. The order of the colours in theſe circles is the ſame as in the rainbow; but on the inſide, with reſpect to the ſun, they are red, as is alſo obſerved in many other corona's.

Parhelia have been viſible for 1, 2, 3, and 4 hours together; and in North America they are ſaid to continue ſome days, and to be viſible from ſun-riſe to ſun-ſet.

When the parhelia diſappear, it ſometimes rains, or there falls ſnow in the form of oblong ſpiculæ, as Maraldi, Weidler, Krafft, and others, have obſerved; and becauſe the air in North America abounds with ſuch frozen ſpiculæ, which are even viſible to the eye, according to Ellis and Middleton, ſuch particles have been thought to be the cauſe of all corona's and parhelia.

Mr Wales ſays, that, at Churchill in Hudſon's Bay, the riſing of the ſun is always preceded by two long ſtreams of red light, one on each ſide of him, and about 20° diſtant from him. Theſe riſe as the ſun riſes; and as they grow longer begin to bend towards each other, till they meet directly over the ſun, juſt as he riſes, forming there a kind of parhelion or mock-ſun. Theſe two ſtreams of light, he ſays, ſeem to have their ſource in two other parhelia, which riſe with the true ſun; and in the winter-ſeaſon, when the ſun never riſes above the haze or fog, which he ſays is conſtantly found near the horizon, all theſe accompany him the whole day, and ſet with him in the ſame manner as they riſe. Once or twice he ſaw a fourth parhelion directly under the true ſun; but this, he ſays, is not common. Theſe facts being conſtant, are very valuable, and may throw great light on the theory of theſe remarkable phenomena.

Sometimes parhelia appear in a different manner; as when three ſuns have been ſeen in the ſame vertical circle, well defined, and touching one another. The true ſun was in the middle, and the loweſt touched the horizon; and they ſet one after the other. This appearance was ſeen by M. Maleziew in 1722. Other appearances ſimilar to this are recited by M. Muſchenbroeck.

Sometimes the ſun has riſen or ſet with a luminous tail projecting from him, of the ſame breadth with his diameter, and perpendicular to the horizon. Such an appearance was ſeen by Caſſini in 1672 and 1692, by de la Hire in 1702, and by Mr Ellis in Hudſon's Bay.

As M. Feuilée was walking on the banks of the river La Plata, he ſaw the ſun riſing over the river with a luminous tail projecting downwards, which continued till he was ſix degrees high.

Paraſelenæ, or mock-moons, have alſo been ſeen, accompanied with tails and coloured circles, like thoſe which accompany the parhelia. An account of ſeveral, and a particular deſcription of a fine appearance of this kind, may be ſeen in Muſchenbroeck.

See Plate CCXXXIII

The Roman phenomenon, obſerved by Scheiner, is famous on account of its having been the firſt appearance of the kind that engaged the attention of philoſophers. It is repreſented in fig. 4.; in which A is the place of the obſerver, B his zenith, C the true ſun, AB a plane paſſing through the obſerver's eye, the true ſun, and the zenith. About the ſun C, there appeared two concentric rings, not complete, but diverſified with colours. The leſſer of them, DEF, was fuller, and more perfect; and though it was open from D to F, yet thoſe ends were perpetually endeavouring to unite; and ſometimes they did ſo. The outer of theſe rings was much fainter, ſo as ſcarcely to be diſcernible. It had, however, a variety of colours; but was very inconſtant. The third circle, KLMN, was very large, and all over white, paſſing through the middle of the ſun, and every where parallel to the horizon. At firſt this circle was entire; but towards the end of the appearance it was weak and ragged, ſo as hardly to be perceived from M towards N.

In the interſection of this circle, and the outward iris GKI, there broke out two parhelia or mock-ſuns, N and K, not quite perfect; K being rather weak, but N ſhone brighter and ſtronger. The brightneſs of the middle of them was ſomething like that of the ſun; but towards the edges they were tinged with colours like thoſe of the rainbow; and they were uneven and ragged. The parhelion N was a little wavering, and ſent out a ſpiked tail, NP, of a colour ſomewhat fiery, the length of which was continually changing.

The parhelia at L and M in the horizontal ring were not ſo bright as the former; but were rounder, and white, like the circle in which they were placed. The parhelion N diſappeared before K; and while M grew fainter, K grew brighter, and vaniſhed the laſt of all.

It is to be obſerved farther, that the order of the colours in the circles DEF, GKN, was the ſame as in the common halos, namely, red next the ſun; and the diameter of the inner circle was alſo about 45 degrees; which is the uſual ſize of a halo.

Various hypotheſes have been framed by philoſophers to account for this phenomenon. None of them are ſatisfactory; but the reader who chooſes to know them may conſult Dr Prieſtley's *Hiſtory of Viſion, Light, and Colours*, vol. ii. p. 619.

PARIA, or New Andalusia, a country of Terra Firma in South America; bounded on the north by the north ſea; on the eaſt, by Surinam; on the weſt, by New Granada and the Caraccas; and on the ſouth, by Guiana. It produces colouring drugs, gums, medicinal roots, Brazil-wood, ſugar, tobacco, and ſome valuable timber; the inland parts being woody and mountainous, but interſperſed with fine valleys that yield corn and paſturage. Comana is the capital town.

PARIAN marble, in the natural hiſtory of the ancients, the white marble uſed then, and to this day, for carving ſtatues, &c. and called by us at this time *ſtatuary marble*.

Too many of the later writers have confounded all the white marbles under the name of the *Parian*; and among the workmen, this and all the other white marbles have the common name of *alabaſters*; ſo that it is in general forgotten among them, that there is ſuch a thing as alabaſter different from marble; which, however, is truly the caſe. Almoſt all the world alſo have confounded the Carrara marble with this, though they are really very different; the Carrara kind being of a finer ſtructure and clearer white than the Parian;

but leſs bright and ſplendid, harder to cut, and not capable of ſo glittering a poliſh.

The true Parian marble has uſually ſomewhat of a faint bluiſh tinge among the white, and often has blue veins in different parts of it. It is ſuppoſed by ſome to have had its name from the iſland Paros, one of the Cyclades in the Ægean Sea, where it was firſt found; but others will have it to have been ſo called from Agoracritus Parius, a famous ſtatuary, who ennobled it by cutting a ſtatue of a Venus in it.

PARIETALIA ossa, in anatomy. See there n° 12.

PARIETARIA, Pellitory *of the* wall; a genus of the order of monœcia belonging to the polygamia claſs of plants. There are ſix ſpecies, of which one named the *officinalis*, is uſed in medicine. This has a creeping root. The ſtalk grows erect, is rough to the touch, and adheſive. The leaves are alternate, elliptical, lanceolate, veined, and a little rough. The flowers grow out of the ala of the leaves, in ſeſſile, branched, verticillate cluſters, of a greeniſh colour tinged with red. The antheræ have a great degree of ſenſibility; for, if irritated with the point of a pin, they fly from the calix with elaſtic force, and throw out their powder.—The plant has a cooling and diuretic quality. Three ounces of the juice taken internally, or a fomentation externally applied, have been found ſerviceable in the ſtrangury.—The plant laid upon heaps of corn infeſted with weevils, is ſaid to drive away thoſe deſtructive inſects.

PARIS (Matthew), one of our beſt hiſtorians from William the Conqueror, to the latter end of the reign of Henry III. But of his life few particulars have been tranſmitted to us. Leland, his original biographer, without determining whether he was born in France or England, informs us, that he was a monk of St Alban's, and that he was ſent by pope Innocent to reform the monks of the convent at Holm in Norway. Biſhop Bale, the next in point of time, adds to the above relation, that, on account of his extraordinary gifts of body and mind, he was much eſteemed, particularly by king Henry III. who commanded him to write the hiſtory of his reign. Fuller makes him a native of Cambridgeſhire, becauſe there was an ancient family of his name in that county. He alſo mentions his being ſent by the pope to viſit the monks in the dioceſe of Norwich. Biſhop Tanner, biſhop Nicolſon, Monſieur du Pin, and the *Nouveau Dictionnaire Hiſtorique*, add not a ſingle fact to thoſe above related. Matthew Paris died in the monaſtery of St Alban's in the year 1259. He was doubtleſs a man of extraordinary knowledge for the 13th century; of an excellent moral character, and, as an hiſtorian, of ſtrict integrity. His ſtyle is unpoliſhed; but that defect is ſufficiently atoned for by the honeſt freedom with which he relates the truth, regardleſs of the dignity or ſanctity of the perſons concerned. His works are, 1. *Hiſtoria ab Adamo ad Conqueſtum Angliæ*, lib. i. manuſcript. col. C. C. Cantab. c. ix. Moſt of this book is tranſcribed, by Matthew of Weſtminſter, into the firſt part of his *Florilegium*. 2. *Hiſtoria major, ſeu rerum Anglicanarum hiſtoria à Gul. Conqueſtoris adventu ad annum* 43 *Henrici* III. &c. ſeveral times printed. The firſt part of this hiſtory, viz. to the year 1235, is tranſcribed almoſt verbatim from the Chronicle of Roger Wendover; and the Appendix, from the year 1260, is the work of William Riſhanger, who was alſo a monk of St Alban's. 3. *Vitæ duorum Offarum, Merciæ regum, S. Albani fundatorum.* 4. *Geſta* 22 *abbatum S. Albani.* 5. *Additamenta chronicorum ad hiſt. majorem*; printed. 6. *Hiſtoria minor, ſive epitome majoris hiſtoriæ*; manuſcript. Beſides many other things in manuſcript.

Paris, the ſon of Priam king of Troy, memorable in hiſtory for carrying off Helena the wife of Menelaus king of Sparta in his abſence, which occaſioned the famous ſiege of Troy. Slain there about 1188 B.C.

Paris, the capital of the kingdom of France; is ſituate on the river Seine, in the iſle of France, being one of the largeſt and fineſt cities in Europe. It derived its modern name from the ancient Pariſii; and is ſuppoſed by ſome to have had the Latin name of *Lutetia*, from *Lutum*, "mud," the place where it now ſtands having been anciently very marſhy and muddy. Ever ſince the reign of Hugh Capet, that is, for near 800 years, this city hath been the uſual reſidence of the kings of France: it is of a circular form, and, including the ſuburbs, about five French leagues, or 15 Engliſh miles, in circumference. The number of its inhabitants is computed at about 500,000; that of its ſtreets 912; and that of its houſes upwards of 20,000, excluſive of the public ſtructures of all ſorts. Its greateſt defect, according to ſome, is the want of good drinking-water; but others tell us, that very fine water is brought by an aqueduct from the village of Arcueil, not far from Paris, but own the water of the Seine, and the city, is not good. The ſtreets are of a proper breadth, well built, paved, and lighted. There is a great number of tribunals and offices here; moſt of which are kept in the Palais, ſituated on an iſland, to which it gives name. The number of churches, convents, hoſpitals, market-places, fountains, gates, and bridges, in this city is very great; beſides the univerſity, ſeveral academies, public libraries, royal palaces and caſtles, and above 100 hotels, ſome of them very ſtately. But to be more particular, that part called *la Cite*, lies in the centre, and conſiſts of three iſlands formed by the Seine, *viz.* L'Iſle de Palais, L'Iſle de Notre Dame, and L'Iſle Louviers. It is the principal of the three parts into which the city is divided, and contains the following remarkable ſtructures: 1. Several bridges; of which ſome are of wood and others of ſtone, and have moſt of them a row of houſes on each ſide. The chief of theſe are the Pont-neuf and Pont-royal: the firſt conſiſts of 12 arches, which, properly ſpeaking, make two bridges, the one leading from the ſuburbs of St Germain to the city, and the other from thence to that part called *la Ville*: there is a carriage-way in the middle, 30 feet broad, and footwalks on each ſide, raiſed two feet high; and in the centre ſtands a braſs ſtatue of king Henry IV. on horſeback. On this bridge is alſo the building called *La Samaritaine*, from a group of figures upon it repreſenting our Saviour and the Samaritan woman, ſtanding near Jacob's well. Here is a pump to raiſe the water, which through ſeveral pipes ſupplies the quarter of the Louvre, and ſome other parts of the town.

The Pont-royal, which leads to the Thuilleries, was built by order of Lewis XIV. in the room of a wooden bridge that was carried away by the current in 1684. 2. The cathedral of Notre Dame, or our Lady, being dedicated to the Holy Virgin, which is a large ſtately Gothic ſtructure, ſaid to have been founded by king Childeric, and built in the form of a croſs. Here, beſides other great perſonages, are interred the cardinals de Retz and Noailles. From the two ſquare towers belonging to it, is a noble proſpect of the city and neighbouring country. Here is a vaſt quantity of gold and ſilver plate, rich tapeſtry, and fine paintings; and the number of the canons is no leſs than 50. Near it ſtands the palace of the archbiſhop, in which is the advocates library: the revenue of the archbiſhop amounts to about 180,000 livres; and his taxation to the court of Rome is 4283 guilders. 3. The priory and pariſh-church of St Bartholomew; the laſt of which is the moſt beautiful in all this part of the city, and ſtands near the Palais. 4. The Palais, which gives name to an iſland, and in which the parliament, with a great many other courts, are held. It was anciently the reſidence of the kings; but was given to the officers of juſtice by Philip the Fair, who alſo ſettled the parliament here in 1302. The parliament, conſiſting of ſeveral chambers, each of which has its department, is opened the day after Martinmas with a ſolemn maſs, celebrated by a biſhop, and continues ſitting till the 8th of September, when a vacation-chamber is appointed during the interval, for criminal cauſes, and others which require diſpatch. The juriſdiction of this court is of great extent. There is a beautiful chapel belonging to the Palais; in which is alſo the priſon, or jail, for the juriſdiction of the parliament, called in French *La Conciergerie.* 5. The Hotel Dieu, the moſt ancient and largeſt hoſpital in Paris, in which 8000 ſick and infirm poor are taken care of, and attended by the nuns of the order of St Auguſtine. 6. The hoſpital of St Catharine, where poor women and maidens are entertained three days, and attended by the abovementioned nuns. 7. The Grande Chatelet, where ſome of the inferior courts of juſtice hold their ſeſſions. 8. Fort l'Eveque, in which is the mint and a priſon. It ſtands in or near the ſtreet La Ferroniere, in which Henry IV. was ſtabbed by Ravilliac. 9. St Germain l'Auxerrois, which is called the *royal palace church;* becauſe the palaces of the Louvre and Thuilleries ſtand in its pariſh. 10. The Louvre, an ancient royal palace, of which a part was rebuilt by Lewis XIV. Had it been completed on the ſame plan, it would have been a moſt magnificent ſtructure. On one of its gates is the following inſcription, *Dum totum impleat orbim:* the meaning of which is, "May it laſt till the owner of it hath extended his ſway over the whole world;" which implies what the French kings have conſtantly aimed at. Another inſcription ſhews, at the ſame time, the vanity of the nation, and their abject flattery of their grande monarque. It may be rendered in Engliſh thus:

Louvre is a palace for great Lewis fit:
God him alone exceeds, as heaven does it.

This palace is joined to the Thuilleries by a gallery, in which are 180 models of fortreſſes, ſome ſituated in France, and ſome in other countries, executed with the utmoſt accuracy. Here is a valuable collection of paintings, the king's printing-houſe, the mint where the king's medals are ſtruck, together with a prodigious quantity of rich tapeſtry hangings, and a collection of ancient arms, among which are thoſe worn by Francis I. at the famous battle of Pavia. Here alſo the French academy, the academy of inſcriptions and belles letters, the royal academy of ſciences, the academy of painting and ſculpture, and the royal academy of architecture, have their meetings. The firſt of theſe was founded for the improvement of the French language; and as for the others, their names explain the deſign of their inſtitution. 11. Le Palais Royal, which was built by cardinal Richlieu, in the year 1636, and belongs to the duke of Orleans. It is ſaid to contain pictures to the value of four millions of livres, which were purchaſed by the regent of that title, and of which a part belonged to Chriſtina queen of Sweden. 12. The palace des Tuilleries, ſo called from a tile or brick-kiln which ſtood there formerly. This palace, as we obſerved above, communicates with the Louvre by a gallery. Behind it are exceeding pleaſant gardens, adorned with fine walks, planted with ever-greens, and other trees, and with beautiful parterres, where are to be ſeen, all the year round, every flower according to its ſeaſon. There are alſo three fine fountains, the garden, and a canal. Behind the Tuilleries, on the bank of the river, are pleaſant walks, compoſed of four rows of lofty elms, to which vaſt crowds of people reſort in the fine weather, as well as to the gardens. In the palace is a ſpacious and magnificent theatre, and hard by it are the Elyſian fields, where a ſurpriſing number of coaches are to be ſeen in fair weather: not far off is the church of St Roche, where the celebrated poet Corneille is interred. 13. La place de Louis le Grand, a very beautiful ſquare, in the centre of which is an equeſtrian ſtatue of that king, which is juſtly accounted a maſter-piece. 14. The Place, or Square des Victoires, which is round, and contains a ſtatue of Lewis XIV. of gilt braſs, erected to him by the duke de la Fuillade, with this inſcription, *Viro immortali.* 15. The Royal Library in the Rue Vivien, which contains 94,000 printed books, 30,000 manuſcripts, and a prodigious collection of copperplates and medals. Near by, in the churchyard of St Joſeph, lies the famous comic poet Moliere. 16. The pariſh-church of St Euſtace, which ſtands in the quarter of the ſame name, and contains the tomb of the great miniſter Colbert. 17. The gate of St Dennis, which was erected as a triumphal arch in honour of Lewis XIV. 18. The gate of St Martin, erected alſo in form of a triumphal arch, in honour of the ſame king. Not far from hence, in the churchyard of St Nicholas des Champs, Peter Gaſſendi, and other learned men, are buried. 19. La Greve, an open place, where all public rejoicings are celebrated, and malefactors executed. 20. The Hotel de Ville, which is a large building of Gothic architecture, tho' adorned with columns of the Corinthian order. 21. The arſenal in the quarter of St Paul, conſiſting of many ſpacious buildings, among which are a foundery, and a houſe for making ſaltpetre. Here is a muſquetoon of two barrels, which it is ſaid will pierce a thick board at the diſtance of ſix miles; and, for diſcerning an object at that diſtance, has a teleſcope fix'd to the barrel. 22. The Baſtile, a kind of fortreſs like the Tower of London, which is uſed as a priſon for ſtate-criminals, and for ſuch as are taken up by letters de cachet, i. e. by warrants ſigned by the king, and ſealed. 23. Le Temple, a commandery of the knights of Malta, which gives name to a quarter, wherein, being a privileged place, artificers, that are not freemen, may carry on their buſineſs without moleſtation. The temple is the reſidence of the grand prior of the French nation. 24. That formerly called *La Maiſon profeſſe des Jeſuites*, in the quarter of St Anthony, in the church of which the hearts of Lewis XIII. and XIV. are preſerved, each in a caſket of gold, ſupported by two angels of maſſy ſilver, and as big as the life, hovering with expanded wings. In the ſame quarter is a fine looking-glaſs manufacture, where above 500 perſons are employed in poliſhing plates caſt at St Gobin; with a convent of Franciſcans, the monks of which are called *Pique-puces*, or *Prick-fleas*.

In that part of the city called the *Univerſity*, the principal places are,

1. The univerſity which gives name to it, and which was firſt founded, as it is ſaid, by Charles the Great: all the arts and ſciences are taught here, particularly law, phyſic, and divinity. There are above forty colleges; of which the chief are thoſe of Sorbonne, of Navarre, of the faculty of phyſic, and of the four nations; but lectures are read only in eleven of them. The head of the univerſity is the rector, who is choſen every three months, but ſometimes is continued ſeveral years. All the profeſſors have ſettled ſalaries; the whole annual income of the univerſity amounting, it is ſaid, to about 50,000 livres. 2. The Gobelins, a houſe or palace, where a great number of ingenious artiſts, in various manufactures and handicrafts, are employed by the government. The moſt curious tapeſtry of all ſorts is made here. 3. The General Hoſpital, a moſt noble foundation for the poor of the female ſex, near 7000 objects being taken care of and provided for. The ſick are carefully tended; and thoſe that are in health are obliged to work; different wards being allotted for foundlings, for girls who ſew or knit, proſtitutes, idiots, and poor women: of the laſt, ſome are kept gratis, and others pay a ſmall matter. In the caſtle of Bicetre, belonging to this hoſpital, and conſiſting of many large buildings, are near 4000 perſons of the other ſex, among which are perſons diſordered in their ſenſes, and ſuch as are afflicted with the venereal diſeaſe. To this hoſpital are alſo ſent children who abuſe their parents, and lead diſſolute lives. The fund for the maintenance of it, and the hoſpital de la Pitie, where poor children are brought up, together with the Hotel Dieu, amounts to above two millions of livres *per annum*. 4. The King's Phyſic Garden, in which are an infinite variety of plants and trees, a certain ſum being allotted by the king for keeping the garden in order, and improving it, and for lectures on botany, anatomy, chemiſtry, and the materia medica. A curious collection of natural curioſities is kept here. 5. The abbey of St Victor, in which is a public library, containing ſome very ancient and ſcarce books, ſeveral curious manuſcripts, and a prodigious collection of maps and copperplates. 6. The College of Phyſicians, to which belong five profeſſors. 7. The Little Chatelet, an old fortreſs, now uſed for a priſon. 8. The Rue St Jacques, chiefly inhabited by bookſellers. 9. The Royal College, and that of Lewis the Great: to the former belong twelve profeſſors. 10. The Abbey of St Genevieve, in which is the marble monument of king Clovis, the ſhrine of St Genevieve, a large library, with a cabinet of antiquities and natural curioſities. 11. The Royal Obſervatory, a moſt ſtately edifice, built on the higheſt part of the city. Several aſtronomers are maintained here by the king. 12. The Royal Academy of ſurgery, inſtituted in 1731. 13. The Convent of Franciſcans, in the quarter of St Andrew, the richeſt in France. In the ſame quarter are ſome remains of the palace of Julian the Apoſtate, in which Childebert, and ſome other kings of the Franks, afterwards reſided. 14. The Play-houſe. 15. The Convent of Carthuſians, in the quarter of Luxemburgh, containing fine paintings. 16. The Palace of Luxemburgh, or Orleans, a magnificent ſtructure, containing alſo ſome fine paintings by Rubens, and embelliſhed with a noble garden. In the Hotel des Ambaſſadeurs, ambaſſadors extraordinary are entertained for three days, and thoſe of remote countries all the time they ſtay at Paris. 17. The Abbey of St Germain des Prez, which contains a very valuable library, the manuſcripts alone making 8,000 volumes: here alſo is a cabinet of antiquities. 18. The Hotel royal des Invalides, erected by Lewis XIV. in which lame and ſuperannuated officers and ſoldiers are maintained. The buildings take up no leſs than 17 acres. The number of common ſoldiers here amount to about 3000, and of officers to about 500. The chapel is very magnificent. Hard by is a military academy, in which 500 young gentlemen are inſtructed in the art of war.

Paris, *herb Paris*, or *truelove*; a genus of the trigynia order, belonging to the octandria claſs of plants. There are but one ſpecies, growing naturally in woods and ſhady places both in Scotland and England. It hath a ſingle naked ſtem, greeniſh bloſſoms, and bluiſh black berries.—The leaves and berries are ſaid to partake of the properties of opium; and the juice of the berries is uſeful in inflammations of the eyes. Linnæus ſays, that the root will vomit as well as ipecacuanha, but muſt be taken in double the quantity. Goats and ſheep eat the the plant; cows, horſes, and ſwine, refuſe it.

PARISH, the precinct of a parochial church, or a circuit of ground inhabited by people who belong to one church, and are under the particular charge of its miniſter.

The word comes from the Latin *parochia*, the Greek ϖαροικια, "habitation;" compounded of παρα, "near," and οικος, "houſe."—Accordingly Du Cange obſerves, that the name ϖαροικια was anciently given to the whole territory of a biſhop, and derives it from neighbourhood; becauſe the primitive Chriſtians, not daring to aſſemble openly in cities, were forced to meet ſecretly in neighbour-houſes.

In the ancient church there was one large edifice in each city for the people to meet in; and this they called *parochia, pariſh*. But the ſignification of the word was afterwards enlarged, and by a pariſh was meant a dioceſe, or the extent of the juriſdiction of a biſhop, conſiſting of ſeveral churches; unleſs we will ſuppoſe, as ſome do, that thoſe biſhops were only paſtors of ſingle churches. See Diocese and Bishop.

Du Pin obſerves, that country pariſhes had not their origin before the 4th century; but thoſe of cities are more ancient. The city of Alexandria is ſaid to have been the firſt that was divided into pariſhes.

PARISII, (anc. geog.), a people of Gallia Celtica, inhabiting the country about the Sequana and Matrona. Now a great part of the iſle of France.—*Pariſii*, (Ptolemy), a people of Britain, having the Brigantes to the north and weſt, the German ſea to the eaſt, and the Coritani to the ſouth, from whom they were ſeparated by the Humber. Now *Holderneſſe*, a peninſula of the Eaſt Riding of Yorkſhire.

PARISIORUM civitas. See Lutetia.

PARIUM, (anc. geog.), a noble city of Myſia Minor, with a port on the Propontis; called *Adraſtia* by Homer, according to Pliny; but Strabo diſtinguiſhes them: according to others, the *Paeſtos* of Homer. *Pariani*, the people, (Strabo). The birth-place of Neoptolemus ſurnamed *Gloſſographus*, (Strabo). Here ſtood a Cupid equal, in exquiſite workmanſhip, to the Cnidian Venus.

PARK, (French *parque*, i. e. *locus incluſus*), is a large quantity of ground incloſed and privileged for wild beaſts of chaſe, by the king's grant or preſcription. See Chase and Forest.

Manwood defines a chaſe to be "a privileged place for beaſts of venary, and other wild beaſts of the foreſt and chaſe, *tam Sylveſtres, quam Campeſtres*;" and differs from a chaſe or warren, in that it muſt be incloſed: for if it lies open, it is good cauſe of ſeizure into the king's hands, as a thing forfeited: as a free chaſe is, if it be incloſed: beſides, the owner cannot have an action againſt ſuch as hunt in his park, if it lies open. No man can erect a park without licence under the broad ſeal; for the common law does not encourage matter of pleaſure, which brings no profit to the commonwealth. But there may be a park in reputation, erected without any lawful warrant; and the owner may bring his action againſt perſons killing his deer.

To a park three things are required. 1. A grant thereof. 2. Incloſures by pale, wall, or hedge. 3. Beaſts of a park; ſuch as the buck, doe, &c. And where all the deer are deſtroyed, it ſhall no more be accounted a park; for a park conſiſts of vert, veniſon, and incloſure; and if it is determined in any of them, it is a total diſparking.

Parks as well as chaſes are ſubject to the common law, and are not to be governed by the foreſt laws.

Park, as connected with gardening. See Gardening.

A park and a garden are more nearly allied than a farm and a garden *, and can therefore be accommodated to each other without any diſparagement to either. A farm loſes ſome of its characteriſtic properties by the connection, and the advantage is on the part of the garden; but a park thus bordered retains all its own excellencies; they are only enriched, not counteracted, by the intermixture. The moſt perfect compoſition of a place that can be imagined, conſiſts of a garden opening into a park, with a ſhort walk through the latter to a farm, and ways along its glades to ridings in the country: but to the farm and the ridings the park is no more than a paſſage; and its woods and its buildings are but circumſtances in their views; its ſcenes can be communicated only to the garden.

The affinity of the two ſubjects is ſo cloſe, that it would be difficult to draw the exact line of ſeparation between them. Gardens have lately encroached very much both in extent and in ſtyle on the character of a park; but ſtill there are ſcenes in the one which are out of the reach of the other. The ſmall ſequeſtrated ſpots which are agreeable in a garden would be trivial in a park; and the ſpacious lawns which are among the nobleſt features of the latter, would in the former fatigue by their want of variety; even ſuch as, being of a moderate extent, may be admitted into either, will ſeem bare and naked, if not broken in the one; and loſe much of their greatneſs, if broken, in the other. The proportion of a part to the whole is a meaſure of its dimenſions: it often determines the proper ſize for an object, as well as the ſpace fit to be allotted to a ſcene; and regulates the ſtyle which ought to be aſſigned to either.

But whatever diſtinctions the extent may occaſion between a park and a garden, a ſtate of highly cultivated nature is conſiſtent with each of their characters; and may in both be of the ſame kind, though in different degrees.

The excellencies both of a park and of a garden are happily blended at Hagley (A), where the ſcenes are equally elegant and noble. It is ſituated in the midſt of a fertile and lovely country, between the Clent and the Witchberry hills; neither of which are within the pale, but both belong to the place. The latter riſe in three beautiful ſwells. One of them is covered with wood; another is an open ſheep-walk, with an obeliſk on the ſummit; on the third, the portico of the temple of Theſeus, exactly on the model of that at Athens, and little leſs in the dimenſions, ſtands boldly out upon the brow, backed by the dark ground of a fir plantation, and has a moſt majeſtic appearance above the ſteeps which fall before and beſide it. The houſe is ſeen to the greateſt advantage from theſe eminences, and every point of them commands ſome beautiful proſpect. The buſy town of Stourbridge is juſt below them; the ruins of Dudley caſtle riſe in the offſkip; the country is full of induſtry and inhabitants; and a ſmall portion of the moor, where the minerals, manufactured in the neighbourhood, are dug, breaking in upon the horizon, accounts for the richneſs, without derogating from the beauty, of the landſcape. From the Clent hills the views are ſtill greater; they extend on one ſide to the black mountains in Wales, a long ridge which appears, at 60 miles diſtance, in the interval between the unweildy heap of the Malvern hills, and the ſolitary peak of the Wrekin, each 30 miles off, and as many aſunder. The ſmoak of Worceſter, the churches in Birmingham, and the houſes in Stourbridge, are diſtinctly viſible. The country is a mixture of hill and dale, and ſtrongly incloſed; except in one part, where a heath, varied by riſing grounds, pieces of water, and ſeveral objects, forms an agreeable contraſt to the cultivation which ſurrounds it. From the other extremity of the Clent hills, the proſpect is leſs extenſive; but the ground is more rude and broken: it is often overſpread with large and beautiful woods; and the view is dignified with numerous ſeats. The hills alſo being very irregular, large advanced promontories frequently interrupt the ſight, and vary the ſcene: in other parts, deep valleys ſhelving down towards the country below, exhibit the objects there in different lights. In one of theſe hollows is built a neat cottage, under a deep deſcent, ſheltered beſides by plantations, and preſenting ideas of retirement in the midſt of ſo much open expoſure; from the heights above it, is ſeen all that view which before was commanded from the Witchberry hills, but which is ſeen here over Hagley park; a noble fore-ground, beautiful in itſelf, and completing the landſcape.

---

* See *Farm* and *Gardening*.

(A) Near Stourbridge, in Worceſterſhire, the ſeat of Lord Lyttelton.

The houſe, though low in the park, is yet above the adjacent country, which it overlooks to a very diſtant horizon. It is ſurrounded by a lawn of fine uneven ground, and diverſified with large clumps, little groupes, and ſingle trees. It is open in front, but covered on one ſide by the Witchberry hills; on the other ſide, and behind, by the eminences in the park, which are high and ſteep, and all overſpread with a lofty hanging wood. The lawn preſſing to the foot, or creeping up the ſlopes of theſe hills, and ſometimes winding along glades into the depth of the wood, traces a beautiful outline to a ſylvan ſcene, already rich to luxuriance in maſſineſs of foliage and ſtatelineſs of growth.

But though the wood appears to be entire, it in reality opens frequently into lawns, which occupy much of the ſpace within it. In the number, the variety, and the beauty of theſe lawns, in the ſhades of the ſeparations between them, in their beauties alſo, and their varieties, the glory of Hagley conſiſts. No two of the openings are alike in dimenſions, in ſhape, or in character. One is of no more than five or ſix acres; another of not leſs than fifty; and others are of all the intermediate ſizes. Some ſtretch out into lengthened glades; ſome widen every way: they are again diſtinguiſhed by buildings, by proſpects, and often by the ſtyle only of the plantations around them. The boundary of one is deſcribed by a few careleſs lines; that of another is compoſed of many parts, very different and very irregular: and the ground is never flat; but falls ſometimes in ſteep deſcents, ſometimes in gentle declivities waves along eaſy ſwells, or is thrown into broken inequalities, with endleſs variety.

An octagon ſeat, ſacred to the memory of Thomſon, and erected on his favourite ſpot, ſtands on the brow of a ſteep; a mead winds along the valley beneath, till it is loſt on either hand behind ſome trees. Oppoſite to the ſeat, a noble wood crowns the top, and feathers down to the bottom of a large, oval, ſwelling hill. As it deſcends on one ſide, the diſtant country becomes the offſkip. Over the fall, on the other ſide, the Clent hills appears. A duſky antique tower ſtands juſt below them, at the extremity of the wood; and in the midſt of it is ſeen a Doric portico, called *Pope's Building*, with part of the lawn before it. The ſcene is very ſimple: the principal features are great; they prevail over all the reſt, and are intimately connected with each other.

The next opening is ſmall, circling about a rotunda on a knole, to the foot of which the ground riſes every way. The trees which ſurround it are large; but their foliage is not very thick; and their ſtems appearing beneath, their ramifications between the boughs are, in ſo confined a ſpot, very diſtinguiſhed and agreeable circumſtances. It is retired; has no proſpect; no viſible outlet but one, and that is ſhort and narrow, to a bridge with a portico upon it, which terminates a piece of water.

The grove behind the rotunda ſeparates this from a large, airy, foreſt glade, thinly ſkirted with wood, careleſs of dreſs, and much overgrown with fern. The wildneſs is an acceptable relief in the midſt of ſo much elegance and improvement as reign in the neighbouring lawns; and the place is in itſelf pleaſant; in no part confined; and from a Gothic ſeat at the end is a perſpective view of that wood and tower which were ſeen before in front, together with the Witchberry hills, and a wide range of country.

The tower, which in proſpect is always connected with wood, ſtands however on a piece of down, which ſtretches along the broad ridge of a hill, and ſpreads on each hand for ſome way down the ſides. Thick groves catch the falls. The deſcent on the right is ſoon loſt under the trees; but that on the left being ſteeper and ſhorter, it may be followed to the bottom. A wood hangs on the declivity, which is continued in the valley beneath. The tower overlooks the whole: it ſeems the remains of a caſtle, partly entire, partly in ruins, and partly overgrown with buſhes. A finer ſituation cannot be imagined: It is placed in an expoſed unfrequented ſpot; commands an extenſive proſpect; and is every where an intereſting object.

At the end of the valley below it, in an obſcure corner, and ſhut out from all view, is a hermitage, compoſed of roots and of moſs: high banks, and a thick covert darkened with horſe-cheſnuts, confine the ſequeſtered ſpot: a little rill trickles through it, and two ſmall pieces of water occupy the bottom. They are ſeen on one ſide through groupes of trees; the other is open, but covered with fern. This valley is the extremity of the park; and the Clent hills riſe in all their irregularity immediately above it.

The other deſcent from the caſtle is a long declivity, covered like the reſt with noble woods, in which fine lawns are again emboſomed, differing ſtill from the former, and from each other. In one, the ground is very rough, the boundary is much broken, and marked only by the trunks of the trees which ſhoot up high before the branches begin. The next is more ſimple; and the ground falls from an even brow into one large hollow, which ſlopes towards the glen, where it ſinks into the covert. This has a communication thro' a ſhort glade, and between two groves, with another called the *Tinian lawn*, from the reſemblance which it is ſaid to bear to thoſe of that celebrated iſland: it is encompaſſed with the ſtatelieſt trees, all freſh and vigorous, and ſo full of leaf, that not a ſtem, not a branch, appears, but large maſſes of foliage only deſcribe an undulating outline: the effect, however, is not produced by the boughs feathering down to the bottom; they in appearance ſhoot out horizontally, a few feet above the ground, to a ſurpriſing diſtance, and form underneath an edging of ſhade, into which the retreat is immediate at every hour of the day. The verdure of the turf is as luxuriant there as in the open ſpace: the ground gently waves in both over eaſy ſwells and little dips, juſt varying, not breaking, the ſurface. No ſtrong lines are drawn; no ſtriking objects are admitted; but all is of an even temper, all mild, placid, and ſerene; in the gayeſt ſeaſon of the day not more than cheerful, in the ſtilleſt watch of night not gloomy. The ſcene is indeed peculiarly adapted to the tranquillity of the latter, when the moon ſeems to repoſe her light on the thick foliage of the grove, and ſteadily marks the ſhade of every bough. It is delightful then to ſaunter here, and ſee the graſs, and the goſſamer which entwines it, gliſtening with dew; to liſten and hear nothing ſtir, except perhaps a withered leaf dropping gently through a tree; and, ſheltered from the chill, to catch the freſhneſs of the evening air: a ſolitary urn, choſen by Mr Pope for the ſpot, and now inſcribed to his memory, when ſhewn by a gleam of moon-light through the trees, fixes that thoughtfulneſs and compoſure to which the mind is inſenſibly led by the reſt of this elegant ſcene.

The Doric Portico, which alſo bears his name, tho' not within ſight, is near: it is placed on the declivity of a hill; and Thomſon's ſeat, with its groves and appendages, are agreeable circumſtances in the proſpect before it. In the valley beneath is fixed a bench, which commands a variety of ſhort views; one is up the aſcent to the portico, and others thro' openings in the wood to the bridge and the rotunda.

The next lawn is large: the ground is ſteep and irregular, but inclines to one direction, and falls from every ſide into the general declivity: the outline is diverſified by many groupes of trees on the ſlopes; and frequent glimpſes of the country are ſeen in perſpective through openings between them. In the brow is a ſeat, in the proudeſt ſituation of all Hagley; it commands a view down the bold ſweep of the lawn, and over a valley filled with the nobleſt trees, up to the heights beyond. One of thoſe heights is covered with a hanging wood; which opens only to ſhew Thomſon's ſeat, and the groves and the ſteeps about it: the others are the Witchberry hills, which ſeem to preſs forward into the landſcape; and the maſſy heads of the trees in the vale, uniting into a continued ſurface, form a broad baſe to the temple of Theſeus, hide the ſwell on which it is built, and crowd up to the very foundation. Farther back ſtands the obeliſk; before it is the ſheep-walk; behind it the Witchberry wood. The temple is backed by the firs; and both theſe plantations are connected with that vaſt ſylvan ſcene, which overſpreads the other hill, and all the intermediate valley. Such extent of wood; ſuch variety in the diſpoſition of it; objects ſo illuſtrious in themſelves, and ennobled by their ſituations, each contraſted to each, every one diſtinct, and all happily united: the parts ſo beautiful of a whole ſo great, ſeen from a charming lawn, and ſurrounded by a delightful country, compoſe all together a ſcene of real magnificence and grandeur.

The ſeveral lawns are ſeparated by the fineſt trees; which ſometimes grow in airy groves, chequered with gleams of light, and open to every breeze; but more frequently, whoſe great branches meeting or croſſing each other, caſt a deep impenetrable ſhade. Large boughs feathering down often intercept the ſight; or a vacant ſpace is filled with coppice-wood, nut, hawthorn, and hornbeam, whoſe tufted heads mixing with the foliage, and whoſe little ſtems cluſtering about the trunks of the trees, thicken and darken the plantation. Here and there the diviſion is of ſuch coppice-wood only, which then being leſs conſtrained and oppreſſed, ſprings up ſtronger, ſpreads further, and joins in a low vaulted covering: in other places the ſhade is high, over-arched by the talleſt aſh, or ſpreads under the branches of the moſt venerable oaks. They riſe in every ſhape, they are diſpoſed in every form in which trees can grow. The ground beneath them is ſometimes almoſt level; ſometimes a gentle ſwell; but generally very irregular and broken. In ſeveral places, large hollows wind down the ſides of the hills, worn in the ſtormy months by water-courſes, but worn many ages ago. Very old oaks in the midſt of the channels prove their antiquity: ſome of them are perfectly dry moſt part of the year; and ſome are watered by little rills all the ſummer: they are deep and broad; the ſides are commonly ſteep; often abrupt and hollow; and the trees on the bank ſometimes extend their roots, all covered with moſs, over the channels of the water. Low down in one of theſe glens, under a thick ſhade of horſe-cheſnuts, is a plain bench, in the midſt of ſeveral little currents and water-falls, running among large looſe ſtones, and the ſtumps of dead trees, with which the ground is broken. On the brink of another glen, which is diſtinguiſhed by a numerous rookery, is a ſeat in a ſtill wilder ſituation, near a deeper hollow, and in a darker gloom: the falls are nearly perpendicular; the roots of ſome of the trees are almoſt bare, from the earth having crumbled away; large boughs of others, ſinking with their own weight, ſeem ready to break from the trunks they belong to; and the fineſt aſh, ſtill growing, lie all aſlant the water-courſe below, which, tho' the ſtream runs in winter only, yet conſtantly retains the black tinge of damp, and caſts a chill all around.

Gravel-walks are conducted acroſs the glens, thro' the woods, the groves, or the thickets, and along the ſides of the lawns, concealed generally from the ſight, but always ready for the communication, and leading to the principal ſcenes. The frequency of theſe walks, the number and the ſtyle of the buildings, and the high preſervation in which all the place is kept, give to the whole park the air of a garden. There is, however, one ſpot more peculiarly adapted to that purpoſe, and more artificially diſpoſed than the reſt; it is a narrow vale, divided into three parts: one of them is quite filled with water, which leaves no room for a path, but thick trees on either ſide come down quite to the brink; and between them the ſight is conducted to the bridge with a portico upon it, which cloſes the view: another part of this vale is a deep gloom, overhung with large aſh and oaks, and darkened below by a number of yews: theſe are ſcattered over very uneven ground, and open underneath; but they are encompaſſed by a thick covert, under which a ſtream falls, from a ſtony channel, down a rock; other rills drop into the current, which afterwards pours over a ſecond caſcade into the third diviſion of the vale, where it forms a piece of water, and is loſt under the bridge. The view from this bridge is a perfect opera ſcene, through all the diviſions of the vale, up to the rotunda. Both theſe buildings, and the other decorations of the ſpot, are of the ſpecies generally confined to a garden. The hermitage alſo, which has been deſcribed, and its appendages, are in a ſtyle which does not belong to a park; but through all the reſt of the place, the two characters are intimately blended. The whole is one ſubject; and it was a bold idea to conceive that one to be capable of ſo much variety; it required the moſt vigorous efforts of a fertile fancy to carry that idea into execution. See GARDENING.

PARK *of Artillery*. See ARTILLERY.

PARK *of Proviſions*, in military affairs, the place where the ſutlers pitch their tents in the rear, and ſell their proviſions to the ſoldiers. Likewiſe that place where the bread-waggons are drawn up, and where the troops receive their ammunition-bread, being the ſtore of the army.

PARKER (Matthew), the ſecond Proteſtant archbiſhop of Canterbury, was born at Norwich in the year 1504, the 19th of Henry VII. His father, who was a man in trade, died when our author was about 12 years old; but his mother took ſpecial care of his education, and at the age of 17 ſent him to Corpus-Chriſti college in Cambridge, where, in 1523, he took his bachelor's degree. In 1527 he was ordained, created maſter of arts, and choſen fellow of the college. Having obtained a licence to preach, he frequently held forth at St Paul's croſs in London, and in other parts of the kingdom. In 1533 or 1534, he was made chaplain to queen Anne Boleyn, who obtained for him the deanry of Stoke-Clare in Suffolk, where he founded a grammar-ſchool. After the death of the queen, king Henry made him his own chaplain, and in 1541, prebendary of Ely. In 1544, he was, by the king's command, elected maſter of Corpus-Chriſti college, and the following year, vice-chancellor of the univerſity. In 1547, he loſt the deanry of Stoke, by the diſſolution of that college. In the ſame year he married the daughter of Robert Harleſtone, a Norfolk gentleman.

In the year 1552, he was nominated, by Edward VI. to the deanry of Lincoln, which, with his other preferments, enabled him to live in great affluence: but the Papiſt Mary was hardly ſeated on the throne, before he was deprived of every thing he held in the church, and obliged to live in obſcurity, frequently changing his place of abode to avoid the fate of the other reformers.

Queen Elizabeth aſcended the throne in 1558; and in the following year Dr Parker, from indigence and obſcurity, was at once raiſed to the ſee of Canterbury, an honour which he neither ſolicited nor deſired. In this high ſtation he acted with ſpirit and propriety. He repaired and beautified his palace at Lambeth at a vaſt expence; founded ſeveral ſcholarſhips in Bennet or Corpus-Chriſti college in Cambridge, and gave large preſents of plate to that and to other colleges in this univerſity. He gave 100 volumes to the public library. He likewiſe founded a free-ſchool at Rochdale in Lancaſhire. He took care to have the ſees filled with pious and learned men; and, conſidering the great want of bibles in many places, he, with the aſſiſtance of other learned men, improved the Engliſh tranſlation, had it printed on a large paper, and diſperſed through the kingdom.

This worthy prelate died in the year 1575, aged 72, and was buried in his own chapel at Lambeth. He was pious without affectation or auſterity, cheerful and contented in the midſt of adverſity, moderate in the height of power, and beneficent beyond example. He wrote ſeveral books; and alſo publiſhed four of our beſt hiſtorians, *Matthew of Weſtminſter; Matthew Paris; Aſſer's Life of king Alfred*; and *Tho. Walſingham*.

PARLEY, a conference with an enemy. Hence, to beat or ſound a parley, is to give a ſignal for holding ſuch a conference by beat of drum, or ſound of trumpet.

PARLIAMENT, the grand aſſembly of the three ſtates of this kingdom, ſummoned together by the king's authority, to conſider of matters relating to the public welfare, and particularly to enact and repeal laws.

The original or firſt inſtitution of parliaments is one of thoſe matters which lie ſo far hidden in the dark ages of antiquity, that the tracing of it out is a thing equally difficult and uncertain. The word *parliament* itſelf (or *colloquium*, as ſome of our hiſtorians tranſlate it) is, comparatively, of modern date; derived from the French, and ſignifying the place where they met and conferred together. It was firſt applied to general aſſemblies of the ſtates under Louis VII. in France, about the middle of the 12th century. But it is certain, that, long before the introduction of the Norman language into England, all matters of importance were debated and ſettled in the great councils of the realm. A practice which ſeems to have been univerſal among the northern nations, particularly the Germans; and carried by them into all the countries of Europe, which they over-ran at the diſſolution of the Roman empire. Relics of which conſtitution, under various modifications and changes, are ſtill to be met with in the diets of Poland, Germany, and Sweden, and the aſſembly of the eſtates in France; for what is there now called the *parliament* is only the ſupreme court of juſtice, conſiſting of the peers, certain dignified eccleſiaſtics, and judges; which neither is in practice, nor is ſuppoſed to be in theory, a general council of the realm.

With us in England, this general council hath been held immemorially, under the ſeveral names of *michel-ſynoth*, or “great council,” *michel-gemote*, or “great meeting,” and more frequently *wittena-gemote*, or “the meeting of wiſe men.” It was alſo ſtyled in Latin, *commune concilium regni, magnum concilium regis, curia magna, conventus magnatum vel procerum, aſſiſa generalis*, and ſometimes *communitas regni Angliæ*. We have inſtances of its meeting to order the affairs of the kingdom, to make new laws, and to amend the old, or, as Fleta expreſſes it, *novis injuriis emerſis nova conſtituere remedia*, ſo early as the reign of Ina king of the weſt Saxons. Offa king of the Mercians, and Ethelbert king of Kent, in the ſeveral realms of the heptarchy. And, after their union, the Mirrour informs us, that king Alfred ordained for a perpetual uſage, that theſe councils ſhould meet twice in the year, or oftener, if need be, to treat of the government of God's people; how they ſhould keep themſelves from ſin, ſhould live in quiet, and ſhould receive right. Our ſucceeding Saxon and Daniſh monarchs held frequent councils of this ſort, as appears from their reſpective codes of laws; the titles whereof uſually ſpeak them to be enacted, either by the king with the advice of his wittena-gemote, or wiſe men, as, *Hæc ſunt inſtituta, quæ Edgarus rex conſilio ſapientum ſuorum inſtituit*; or to be enacted by thoſe ſages with the advice of the king, as, *Hæc ſunt judicia, quæ ſapientes conſilio regis Ethelſtani inſtituerunt*; or laſtly, to be enacted by them both together, as, *Hæ ſunt inſtitutiones, quas rex Edmundus et epiſcopi ſui cum ſapientibus ſuis inſtituerunt*.

There is alſo no doubt but theſe great councils were occaſionally held under the firſt princes of the Norman line. Glanvil, who wrote in the reign of Henry II. ſpeaking of the particular amount of an amercement in the ſheriff's court, ſays, it had never yet been aſcertained by the general aſſize, or aſſembly, but was left to the cuſtom of particular counties. Here the general aſſize is ſpoken of as a meeting well known, and its ſtatutes or deciſions are put in a manifeſt contradiſtinction to cuſtom, or the common law. And in Edward III's time an act of parliament, made in the reign of William the Conqueror, was pleaded in the caſe of the abbey of St Edmund's-bury, and judicially allowed by the court.

Hence it indiſputably appears, that parliaments, or general councils, are coeval with the kingdom itſelf. How thoſe parliaments were conſtituted and compoſed, is another queſtion, which has been matter of great diſpute among our learned antiquarians; and particularly, whether the commons were ſummoned at all; or, if ſummoned, at what period they began to form a diſtinct aſſembly. But without entering into controverſies of this ſort, it may be ſufficient to obſerve, that it is generally agreed, that in the main the conſtitution of parliament, as it now ſtands, was marked out ſo long ago as the 17th year of king John, A. D. 1215, in the great charter granted by that prince; wherein he promiſes to ſummon all archbiſhops, biſhops, abbots, earls, and greater barons, perſonally; and all other tenants in chief under the crown, by the ſheriff and bailiffs; to meet at a certain place, with 40 days notice, to aſſeſs aids and ſcutages when neceſſary. And this conſtitution has ſubſiſted in fact at leaſt from the year 1266, 49 Hen. III. there being ſtill extant writs of that date, to ſummon knights, citizens, and burgeſſes, to parliament. We proceed therefore to inquire wherein conſiſts this conſtitution of parliament, as it now ſtands, and has ſtood for the ſpace of at leaſt 500 years. And in the proſecution of this inquiry, we ſhall conſider, firſt, The manner and time of its aſſembling: Secondly, Its conſtituent parts: Thirdly, The laws and cuſtoms relating to parliament: Fourthly, The methods of proceeding, and of making ſtatutes, in both houſes: And, laſtly, The manner of the parliament's adjournment, prorogation, and diſſolution.

I. *As to the manner and time of aſſembling*. The parliament is regularly to be ſummoned by the king's writ or letter, iſſued out of chancery by advice of the privy-council, at leaſt 40 days before it begins to ſit. It is a branch of the royal prerogative, that no parliament can be convened by its own authority, or by the authority of any, except the king alone. And this prerogative is founded upon very good reaſon. For, ſuppoſing it had a right to meet ſpontaneouſly, without being called together, it is impoſſible to conceive that all the members, and each of the houſes, would agree unanimouſly upon the proper time and place of meeting: and if half of the members met, and half abſented themſelves, who ſhall determine which is really the legiſlative body, the part aſſembled, or that which ſtays away? It is therefore neceſſary, that the parliament ſhould be called together at a determinate time and place; and, highly becoming its dignity and independence, that it ſhould be called together by none but one of its own conſtituent parts: and, of the three conſtitnent parts, this office can only appertain to the king; as he is a ſingle perſon, whoſe will may be uniform and ſteady; the firſt perſon in the nation, being ſuperior to both houſes in dignity; and the only branch of the legiſlature that has a ſeparate exiſtence, and is capable of performing any act at a time when no parliament is in being. Nor is it an exception to this rule, that, by ſome modern ſtatutes, on the demiſe of a king or queen, if there be then no parliament in being, the laſt parliament revives, and is to ſit again for ſix months, unleſs diſſolved by the ſucceſſor: for this revived parliament muſt have been originally ſummoned by the crown.

It is true, that the convention-parliament which reſtored king Charles II. met above a month before his return; the lords by their own authority, and the commons in purſuance of writs iſſued in the name of the keepers of the liberty of England by authority of parliament; and that the ſaid parliament ſat till the 29th of December, full ſeven months after the Reſtoration; and enacted many laws, ſeveral of which are ſtill in force. But this was for the neceſſity of the thing, which ſuperſedes all law; for if they had not ſo met, it was morally impoſſible that the kingdom ſhould have been ſettled in peace. And the firſt thing done after the king's return was, to paſs an act declaring this to be a good parliament, notwithſtanding the defect of the king's writs. So that as the royal prerogative was chiefly wounded by their ſo meeting, and as the king himſelf, who alone had a right to object, conſented to wave the objection, this cannot be drawn into an example in prejudice of the rights of the crown. Beſides, we ſhould alſo remember, that it was at that time a great doubt among the lawyers, whether even this healing act made it a good parliament, and held by very many in the negative; though it ſeems to have been too nice a ſcruple. And yet, out of abundant caution, it was thought neceſſary to confirm its acts in the next parliament, by ſtatute 13 Car. II. c. 7. & c. 14.

It is likewiſe true, at the time of the Revolution, A. D. 1688, the lords and commons by their own authority, and upon the ſummons of the prince of Orange, (afterwards king William), met in a convention, and therein diſpoſed of the crown and kingdom. But it muſt be remembered, that this aſſembling was upon a like principle of neceſſity as at the Reſtoration; that is, upon a full conviction that king James the ſecond had abdicated the government, and that the throne was thereby vacant: which ſuppoſition of the individual members was confirmed by their concurrent reſolution, when they actually came together. And, in ſuch a caſe as the palpable vacancy of a throne, it follows *ex neceſſitate rei*, that the form of the royal writs muſt be laid aſide, otherwiſe no parliament can ever meet again. For let us put another poſſible caſe, and ſuppoſe, for the ſake of argument, that the whole royal line ſhould at any time fail, and become extinct, which would indiſputably vacate the throne: in this ſituation it ſeems reaſonable to preſume, that the body of the nation, conſiſting of lords and commons, would have a right to meet and ſettle the government; otherwiſe there muſt be no government at all. And upon this and no other principle did the convention in 1688 aſſemble. The vacancy of the throne was precedent to their meeting without any royal ſummons, not a conſequence of it. They did not aſſemble without writ, and then make the throne vacant; but, the throne being previouſly vacant by the king's abdication, they aſſembled without writ, as they muſt do if they aſſembled at all. Had the throne been full, their meeting would not have been regular; but, as it was really empty, ſuch meating became abſolutely neceſſary. And accordingly it is declared by ſtatute 1 W. & M. ſt. 1. c. 1. that this convention was really the two houſes of parliament, notwithſtanding the want of writs or other defects of form. So that, notwithſtanding theſe two capital exceptions, which were juſtifiable only on a principle of neceſſity, (and each of which, by the way, induced a revolution in the government), the rule laid down is in general certain, that the king only can convoke a parliament.

And this, by the ancient ſtatutes of the realm, he is bound to do every year, or oftener, if need be. Not that he is, or ever was, obliged by theſe ſtatutes to call a new parliament every year; but only to permit a parliament to ſit annually for the redreſs of grievances, and diſpatch of buſineſs, if need be. Theſe laſt words are ſo looſe and vague, that ſuch of our monarchs as were inclined to govern without parliaments, neglected the convoking them, ſometimes for a very conſiderable period, under pretence that there was no need of them. But, to remedy this, by the ſtatute 16 Car. II. c. 1. it is enacted, that the ſitting and holding of parliaments ſhall not be intermitted above three years at the moſt. And by the ſtatute 1. W. & M. ſt. 2. c. 2. it is declared to be one of the rights of the people, that for redreſs of all grievances, and for the amending, ſtrengthening, and preſerving the laws, parliaments ought to be held frequently. And this indefinite frequency is again reduced to a certainty by ſtatute 6 W. & M. c. 2. which enacts, as the ſtatute of Charles the ſecond had done before, that a new parliament ſhall be called within three years after the determination of the former.

II. *The conſtituent parts of a parliament are*, the king's majeſty, ſitting there in his royal political capacity, and the three eſtates of the realm; the lords ſpiritual, the lords temporal, (who ſit together with the king in one houſe), and the commons, who ſit by themſelves in another. And the king and theſe three eſtates together form the great corporation or body politic of the kingdom, of which the king is ſaid to be *caput, principium, et finis*. For upon their coming together the king meets them, either in perſon or by repreſentation; without which there can be no beginning of a parliament; and he alſo has alone the power of diſſolving them.

It is highly neceſſary for preſerving the balance of the conſtitution, that the executive power ſhould be a branch, thoug not the whole, of the legiſlature. The total union of them, we have ſeen, would be productive of tyranny; the total disjunction of them, for the preſent, would in the end produce the ſame effects, by cauſing that union againſt which it ſeems to provide. The legiſlature would ſoon become tyrannical, by making continual encroachments, and gradually aſſuming to itſelf the rights of the executive power. Thus the long parliament of Charles the firſt, while it acted in a conſtitutional manner, with the royal concurrence, redreſſed many heavy grievances and eſtabliſhed many ſalutary laws. But when the two houſes aſſumed the power of legiſlation, in excluſion of the royal authority, they ſoon after aſſumed likewiſe the reins of adminiſtration; and, in conſequence of theſe united powers, overturned both church and ſtate, and eſtabliſhed a worſe oppreſſion than any they pretended to remedy. To hinder therefore any ſuch encroachments, the king is himſelf a part of the parliament; and as this is the reaſon of his being ſo, very properly therefore the ſhare of legiſlation which the conſtitution has placed in the crown, conſiſts in the power of rejecting, rather than reſolving; this being ſufficient to anſwer the end propoſed. For we may apply to the royal negative, in this inſtance, what Cicero obſerves of the negative of the Roman tribunes, that the crown has not any power of doing wrong, but merely of preventing wrong from being done. The crown cannot begin of itſelf any alterations in the preſent eſtabliſhed law; but it may approve or diſapprove of the alterations ſuggeſted and conſented to by the two houſes. The legiſlature therefore cannot abridge the executive power of any rights which it now has by law, without its own conſent; ſince the law muſt perpetually ſtand as it now does, unleſs all the powers will agree to alter it. And herein indeed conſiſts the true excellence of the Britiſh government, that all the parts of it form a mutual check upon each other. In the legiſlature, the people are a check upon the nobility, and the nobility a check upon the people, by the mutual privilege of rejecting what the other has reſolved; while the king is a check upon both, which preſerves the executive power from encroachments. And this very executive power is again checked and kept within due bounds by the two houſes, through the privilege they have of inquiring into, impeaching, and puniſhing the conduct (not indeed of the king, which would deſtroy his conſtitutional independence; but, which is more beneficial to the public) of his evil and pernicious counſellors. Thus every branch of our civil polity ſupports and is ſupported, regulates and is regulated, by the reſt: for the two houſes naturally drawing in two directions of oppoſite intereſt, and the prerogative in another ſtill different from them both, they mutually keep each other from exceeding their proper limits; while the whole is prevented from ſeparation, and artificially connected together by the mixed nature of the crown, which is a part of the legiſlative, and the ſole executive magiſtrate. Like three diſtinct powers in mechanics, they jointly impel the machine of government in a direction different from what either, acting by itſelf, would have done; but at the ſame time in a direction partaking of each, and formed out of all; a direction which conſtitutes the true line of the liberty and happineſs of the community.

Having already conſidered theſe conſtituent parts of the ſovereign power, or parliament, each in a ſeparate view, under the articles King, Lords, and Commons, to which the reader is referred, we proceed,

III. To examine the laws and cuſtoms relating to parliament, united together and conſidered as one aggregate body. The power and juriſdiction of parliament, ſays Sir Edward Coke, is ſo tranſcendent and abſolute, that it cannot be confined, either for cauſes or perſons, within any bounds. And of this high court he adds, it may be truly ſaid, *Si antiquitatem ſpectes, eſt vetuſtiſſima; ſi dignitatem, eſt honoratiſſima; ſi juriſdictionem, eſt capaciſſima.* It hath ſovereign and uncontrolable authority in making, confirming, enlarging, reſtraining, abrogating, repealing, reviving, and expounding of laws, concerning matters of all poſſible denominations, eccleſiaſtical or temporal, civil, military, maritime, or criminal: this being the place where that abſolute deſpotic power, which muſt in all governments reſide ſomewhere, is entruſted by the conſtitution of theſe kingdoms. All miſchiefs and grievances, operations and remedies, that tranſcend the ordinary courſe of the laws, are within the reach of this extraordinary tribunal. It can regulate or new-model the ſucceſſion to the crown; as was done in the reign of Henry VIII. and William III. It can alter the eſtabliſhed religion of the land; as was done in a variety of inſtances, in the reigns of king Henry VIII. and his three children. It can change and create afreſh even the conſtitution of the kingdom and of parliaments themſelves; as was done by the act of union, and the ſeveral ſtatutes for triennial and ſeptennial elections. It can, in ſhort, do every thing that is not naturally impoſſible; and therefore ſome have not ſcrupled to call its power, by a figure rather too bold, the *omnipotence of parliament*. True it is, that what the parliament doth, no authority upon earth can undo. So that it is a matter moſt eſſential to the liberties of this kingdom, that ſuch members be delegated to this important truſt as are moſt eminent for their probity, their fortitude, and their knowledge; for it was a known apothegm of the great lord treaſurer Burleigh, "That England could never be ruined but by a parliament;" and, as Sir Matthew Hale obſerves, this being the higheſt and greateſt court, over which none other can have juriſdiction in the kingdom, if by any means a miſgovernment ſhould any way fall upon it, the ſubjects of this kingdom are left without all manner of remedy. To the ſame purpoſe the preſident Monteſquieu, though we truſt too haſtily, preſages, that as Rome, Sparta, and Carthage, have loſt their liberty and periſhed; ſo the conſtitution of England will in time loſe its liberty, will periſh: it will periſh whenever the legiſlative power ſhall become more corrupt than the executive.

It muſt be owned that Mr Locke, and other theoretical writers, have held, that "there remains ſtill inherent in the people a ſupreme power to remove or alter the legiſlative, when they find the legiſlative act contrary to the truſt repoſed in them; for when ſuch truſt is abuſed, it is thereby forfeited, and devolves to thoſe who gave it." But however juſt this concluſion may be in theory, we cannot adopt it, nor argue from it, under any diſpenſation of government at preſent actually exiſting. For this devolution of power, to the people at large, includes in it a diſſolution of the whole form of government eſtabliſhed by that people; reduces all the members to their original ſtate of equality; and by annihilating the ſovereign power, repeals all poſitive laws whatſoever before enacted. No human laws will therefore ſuppoſe a caſe, which at once muſt deſtroy all law, and compel men to build afreſh upon a new foundation; nor will they make proviſion for ſo deſperate an event, as muſt render all legal proviſions ineffectual. So long therefore as the Engliſh conſtitution laſts, we may venture to affirm, that the power of parliament is abſolute and without control.

In order to prevent the miſchiefs that might ariſe, by placing this extenſive authority in hands that are either incapable or elſe improper to manage it, it is provided by the cuſtom and law of parliament, that no one ſhall ſit or vote in either houſe, unleſs he be 21 years of age. This is alſo expreſsly declared by ſtatute 7 & 8 W. III. c. 25: with regard to the houſe of commons, doubts have ariſen, from ſome contradictory adjudications, whether or no a minor was incapacitated from ſitting in that houſe. It is alſo enacted by ſtatute 7 Jac. I. c. 6. that no member be permitted to enter the houſe of commons till he hath taken the oath of allegiance before the lord ſteward or his deputy: and by 30 Car. II. ſt. 2. and 1 Geo. I. c. 13. that no member ſhall vote or ſit in either houſe till he hath, in the preſence of the houſe, taken the oaths of allegiance, ſupremacy, and abjuration, and ſubſcribed and repeated the declaration againſt tranſubſtantiation, and invocation of ſaints, and the ſacrifice of the maſs. Aliens, unleſs naturalized, were likewiſe by the law of parliament incapable to ſerve therein: and now it is enacted, by ſtatute 12 & 13 W. III. c. 2. that no alien, even though he be naturalized, ſhall be capable of being a member of either houſe of parliament. And there are not only theſe ſtanding incapacities; but if any perſon is made a peer by the king, or elected to ſerve in the houſe of commons by the people, yet may the reſpective houſes, upon complaint of any crime in ſuch perſon, and proof thereof, adjudge him diſabled and incapable to ſit as a member: and this by the law and cuſtom of parliament.

For as every court of juſtice hath laws and cuſtoms for its direction, ſome the civil and canon, ſome the common law, others their own peculiar laws and cuſtoms; ſo the high court of parliament hath alſo its own peculiar law, called the *lex et conſuetudo parliamenti*; a law which Sir Edward Coke obſerves is *ab omnibus quærenda, a multis ignorata, a paucis cognita.* It will not therefore be expected that we ſhould enter into the examination of this law with any degree of minuteneſs; ſince, as the ſame learned author aſſures us, it is much better to be learned out of the rolls of parliament and other records, and by precedents and continual experience, than can be expreſſed by any one man. It will be ſufficient to obſerve, that the whole of the law and cuſtom of parliament has its original from this one maxim, "That whatever matter ariſes concerning either houſe of parliament, ought to be examined, diſcuſſed, and adjudged in that houſe to which it relates, and not elſewhere." Hence, for inſtance, the lords will not ſuffer the commons to interfere in ſettling the election of a peer of Scotland; the commons will not allow the lords to judge of the election of a burgeſs; nor will either houſe permit the ſubordinate courts of law to examine the merits of either caſe. But the maxims upon which they proceed, together with the method of proceeding, reſt entirely in the breaſt of the parliament itſelf; and are not defined and aſcertained by any particular ſtated laws.

The privileges of parliament are likewiſe very large and indefinite; and therefore, when, in 31ſt Hen. VI. the houſe of lords propounded a queſtion to the judges concerning them, the chief juſtice, Sir John Forteſcue, in the name of his brethren, declared, "That they ought not to make anſwer to that queſtion; for it hath not been uſed aforetime, that the juſtices ſhould in any wiſe determine the privileges of the high court of parliament; for it is ſo high and mighty in its nature, that it may make law; and that which is law, it may make no law: and the determination and knowledge of that privilege belongs to the lords of parliament, and not to the juſtices." Privilege of parliament was principally eſtabliſhed, in order to protect its members not only from being moleſted by their fellow-ſubjects, but alſo more eſpecially from being oppreſſed by the power of the crown. If therefore all the privileges of parliament were once to be ſet down and aſcertained, and no privilege to be allowed but what was ſo defined and determined, it were eaſy for the executive power to deviſe ſome new caſe, not within the line of privilege, and under pretence thereof to harraſs any refractory member, and violate the freedom of parliament. The dignity and independence of the two houſes are therefore in great meaſure preſerved by keeping their privileges indefinite. Some, however, of the more notorious privileges of the members of either houſe, are privilege of ſpeech, of perſon, of their domeſtics, and of their lands and goods. As to the firſt, privilege of ſpeech, it is declared by the ſtatute 1 W. & M. ſt. 2. c. 2. as one of the liberties of the people, "That the freedom of ſpeech, and debates, and proceedings in parliament, ought not to be impeached or queſtioned in any court or place out of parliament." And this freedom of ſpeech is particularly demanded of the king in perſon, by the ſpeaker of the houſe of commons, at the opening of every new parliament. So likewiſe are the other privileges, of perſon, ſervants, lands, and goods; which are immunities as ancient as Edward the Confeſſor: in whoſe laws we find this precept, *Ad ſynodos venientibus, ſive ſummoniti ſint, ſive per ſe quid agendum habuerint ſit ſumma pax*; and ſo too in the old Gothic conſtitutions, *Extenditur hæc pax et ſecuritas ad quatuordecim dies, convocato regni ſenatu.* This included formerly not only privilege from illegal violence, but alſo from legal arreſts and ſeizures by proceſs from the courts of law. And ſtill to aſſault by violence a member of either houſe, or his menial ſervants, is a high contempt of parliament, and there puniſhed with the utmoſt ſeverity. It has likewiſe peculiar penalties annexed to it in the courts of law by the ſtatutes 5 Hen. IV. c. 6. and 11 Hen. VI. c. 11. Neither can any member of either houſe be arreſted and taken into cuſtody without a breach of the privilege of parliament.

But all other privileges which derogate from the common law are now at an end, ſave only as to the freedom of the member's perſon; which in a peer (by the privilege of peerage) is for ever ſacred and inviolable; and in a commoner (by the privilege of parliament) for forty days after every prorogation, and forty days before the next appointed meeting; which is now in effect as long as the parliament ſubſiſts, it ſeldom being prorogued for more than eighty days at a time. As to all other privileges which obſtruct the ordinary courſe of juſtice, they were reſtrained by the ſtatutes 12 W. III. c. 3. 2 & 3 Ann. c. 18. and 11 Geo. II. c. 24. and are now totally aboliſhed by ſtatute 10 G. III. c. 50.; which enacts, that any ſuit may at any time be brought againſt any peer or member of parliament, their ſervants, or any other perſon entitled to privilege of parliament; which ſhall not be impeached or delayed by pretence of any ſuch privilege, except that the perſon of a member of the houſe of commons ſhall not thereby be ſubjected to any arreſt or impriſonment. Likewiſe, for the benefit of commerce, it is provided by ſtatute 4 Geo. III. c. 33. that any trader, having privilege of parliament, may be ſerved with legal proceſs for any juſt debt, (to the amount of 100l.); and unleſs he makes ſatisfaction within two months, it ſhall be deemed an act of bankruptcy; and that commiſſions of bankrupt may be iſſued againſt ſuch privileged traders in like manner as againſt any other.

The only way by which courts of juſtice could anciently take cognizance of privilege of parliament was by writ of privilege, in the nature of a *ſuperſedeas*, to deliver the party out of cuſtody when arreſted in a civil ſuit. For when a letter was written by the ſpeaker to the judges, to ſtay proceedings againſt a privileged perſon, they rejected it as contrary to their oath of office. But ſince the ſtatute 12 Will. III. c. 3. which enacts, that no privileged perſon ſhall be ſubject to arreſt or impriſonment, it hath been held, that ſuch arreſt is irregular *ab initio*, and that the party may be diſcharged upon motion. It is to be obſerved, that there is no precedent of any ſuch writ of privilege, but only in civil ſuits; and that the ſtatute of 1 Jac. I. c. 13. and that of king William, (which remedy ſome inconveniencies ariſing from privilege of parliament), ſpeak only of civil actions. And therefore the claim of privilege hath been uſually guarded with an exception as to the caſe of indictable crimes; or, as it hath been frequently expreſſed, of treaſon, felony, and breach (or ſurety) of the peace. Whereby it ſeems to have been underſtood, that no privilege was allowable to the members, their families, or ſervants, in any *crime* whatſoever; for all crimes are treated by the law as being *contra pacem domini regis*. And inſtances have not been wanting, wherein privileged perſons have been convicted of miſdemeſnors, and committed, or proſecuted to outlawry, even in the middle of a ſeſſion; which proceeding has afterwards received the ſanction and approbation of parliament. To which may be added, that a few years ago, the caſe of writing and publiſhing ſeditious libels was reſolved by both houſes not to be entitled to privilege; and that the reaſons upon which that caſe proceeded, extended equally to every indictable offence. So that the chief, if not the only, privilege of parliament, in ſuch caſes, ſeems to be the right of receiving immediate information of the impriſonment or detention of any member, with the reaſon for which he is detained: a practice that is daily uſed upon the ſlighteſt military accuſations, preparatory to a trial by a court-martial; and which is recognized by the ſeveral temporary ſtatutes for ſuſpending the *habeas corpus* act: whereby it is provided, that no member of either houſe ſhall be detained, till the matter of which he ſtands ſuſpected be firſt communicated to the houſe of which he is a member, and the conſent of the ſaid houſe obtained for his commitment or detaining. But yet the uſage has uniformly been, ever ſince the Revolution, that the communication has been ſubſequent to the arreſt.

Theſe are the general heads of the laws and cuſtoms relating to parliament, conſidered as one aggregate body. The laws and cuſtoms relating to each branch in particular being explained under the articles already referred to, *viz.* KING, LORDS, and COMMONS, we ſhould proceed, IV. To the method of making laws; which is much the ſame in both houſes. But for this, too, we have to refer the reader to the article BILL; and ſhall only obſerve in this place, that, for diſpatch of buſineſs, each houſe of parliament has its ſpeaker. The ſpeaker of the houſe of lords, whoſe office it is to preſide there, and manage the formality of buſineſs, is the lord chancellor, or keeper of the king's great ſeal, or any other appointed by the king's commiſſion: and if none be ſo appointed, the houſe of lords (it is ſaid) may elect. The ſpeaker of the houſe of commons is choſen by the houſe; but muſt be approved by the king. And herein the uſage of the two houſes differs, that the ſpeaker of the houſe of commons cannot give his opinion or argue any queſtion in the houſe; but the ſpeaker of the houſe of lords, if a lord of parliament, may. In each houſe the act of the majority binds the whole; and this majority is declared by votes openly and publicly given; not, as at Venice, and many other ſenatorial aſſemblies, privately, or by ballot. This latter method may be ſerviceable, to prevent intrigues and unconſtitutional combinations; but is impoſſible to be practiſed with us, at leaſt in the houſe of commons, where every member's conduct is ſubject to the future cenſure of his conſtituents, and therefore ſhould be openly ſubmitted to their inſpection.

V. There remains only, in the laſt place, to add a word or two concerning the manner in which parliaments may be *adjourned, prorogued,* or *diſſolved.*

An *adjournment* is no more than a continuance of the ſeſſion from one day to another; as the word itſelf ſignifies: and this is done by the authority of each houſe ſeparately every day; and ſometimes for a fortnight or a month together, as at Chriſtmas or Eaſter, or upon other particular occaſions. But the adjournment of one houſe is no adjournment of the other. It hath alſo been uſual, when his Majeſty hath ſignified his pleaſure that both or either of the houſes ſhould adjourn themſelves to a certain day, to obey the king's pleaſure ſo ſignified, and to adjourn accordingly. Otherwiſe, beſides the indecorum of a refuſal, a prorogation would aſſuredly follow; which would often be very inconvenient to both public and private buſineſs. For prorogation puts an end to the ſeſſion; and then ſuch bills as are only begun and not perfected, muſt be reſumed *de novo,* (if at all), in a ſubſequent ſeſſion; whereas, after an adjournment, all things continue in the ſame ſtate as at the time of the adjournment made, and may be proceeded on without any freſh commencement.

A *prorogation* is the continuance of the parliament from one ſeſſion to another; as an adjournment is a continuation of the ſeſſion from day to day. This is done by the royal authority, expreſſed either by the lord chancellor in his Majeſty's preſence, or by commiſſion from the crown, or frequently by proclamation. Both houſes are neceſſarily prorogued at the ſame time; it not being a prorogation of the houſe of lords or commons, but of the parliament. The ſeſſion is never underſtood to be at an end until a prorogation; though, unleſs ſome act be paſſed, or ſome judgment given in parliament, it is in truth no ſeſſion at all. And formerly the uſage was, for the king to give the royal aſſent to all ſuch bills as he approved at the end of every ſeſſion, and then to prorogue the parliament, though ſometimes only for a day or two; after which all buſineſs then depending in the houſes was to be begun again. Which cuſtom obtained ſo ſtrongly, that it once became a queſtion, Whether giving the royal aſſent to a ſingle bill did not of courſe put an end to the ſeſſion? And though it was then reſolved in the negative, yet the notion was ſo deeply rooted, that the ſtatute 1 Car. I. c. 7. was paſſed to declare, that the king's aſſent to that and ſome other acts ſhould not put an end to the ſeſſion; and even ſo late as the reign of Charles II. we find a proviſo frequently tacked to a bill, that his Majeſty's aſſent thereto ſhould not determine the ſeſſion of parliament. But it now ſeems to be allowed, that a prorogation muſt be expreſsly made, in order to determine the ſeſſion. And if at the time of an actual rebellion, or imminent danger of invaſion, the parliament ſhall be ſeparated by adjournment or prorogation, the king is empowered to call them together by proclamation, with 14 days notice of the time appointed for their reaſſembling.

A *diſſolution* is the civil death of the parliament; and this may be effected three ways: 1. By the king's will, expreſſed either in perſon or by repreſentation. For as the king has the ſole right of convening the parliament, ſo alſo it is a branch of the royal prerogative, that he may (whenever he pleaſes) prorogue the parliament for a time, or put a final period to its exiſtence. If nothing had a right to prorogue or diſſolve a parliament but itſelf, it might happen to become perpetual. And this would be extremely dangerous, if at any time it ſhould attempt to encroach upon the executive power; as was fatally experienced by the unfortunate king Charles I.; who, having unadviſedly paſſed an act to continue the parliament then in being till ſuch time as it ſhould pleaſe to diſſolve itſelf, at laſt fell a ſacrifice to that inordinate power which he himſelf had conſented to give them. It is therefore extremely neceſſary that the crown ſhould be empowered to regulate the duration of theſe aſſemblies, under the limitations which the Engliſh conſtitution has preſcribed: ſo that, on the one hand, they may frequently and regularly come together for the diſpatch of buſineſs and redreſs of grievances; and may not, on the other, even with the conſent of the crown, be continued to an inconvenient or unconſtitutional length.

2. A parliament may be diſſolved by the demiſe of the crown. This diſſolution formerly happened immediately upon the death of the reigning ſovereign: for he being conſidered in law as the head of the parliament, (*caput, principium, et finis*), that failing, the

whole body was held to be extinct. But the calling a new parliament immediately on the inauguration of the ſucceſſor being found inconvenient, and dangers being apprehended from having no parliament in being in caſe of a diſputed ſucceſſion, it was enacted by the ſtatutes 7 & 8 W. III. c. 15. and 6 Ann. c. 7. that the parliament in being ſhall continue for ſix months after the death of any king or queen, unleſs ſooner prorogued or diſſolved by the ſucceſſor: that if the parliament be, at the time of the king's death, ſeparated by adjournment or prorogation, it ſhall notwithſtanding aſſemble immediately: and that if no parliament is then in being, the members of the laſt parliament ſhall aſſemble, and be again a parliament.

3. Laſtly, a parliament may be diſſolved or expire by length of time. For if either the legiſlative body were perpetual, or might laſt for the life of the prince who convened them as formerly, and were ſo to be ſupplied, by occaſionally filling the vacancies with new repreſentatives; in theſe caſes, if it were once corrupted, the evil would be paſt all remedy; but when different bodies ſucceed each other, if the people ſee cauſe to diſapprove of the preſent, they may rectify its faults in the next. A legiſlative aſſembly alſo, which is ſure to be ſeparated again, (whereby its members will themſelves become private men, and ſubject to the full extent of the laws which they have enacted for others), will think themſelves bound, in intereſt as well as duty, to make only ſuch laws as are good. The utmoſt extent of time that the ſame parliament was allowed to ſit, by the ſtatute 6 W. & M. c. 3. was *three* years; after the expiration of which, reckoning from the return of the firſt ſummons, the parliament was to have no longer continuance. But by the ſtatute 1 Geo. I. ſt. 2. c. 38. (in order, profeſſedly, to prevent the great and continued expences of frequent elections, and the violent heats and animoſities conſequent thereupon, and for the peace and ſecurity of the government then juſt recovering from the late rebellion), this term was prolonged to *ſeven* years; and, what alone is an inſtance of the vaſt authority of parliament, the very ſame houſe that was choſen for three years, enacted its own continuance for ſeven. So that, as our conſtitution now ſtands, the parliament muſt expire, or die a natural death, at the end of every ſeventh year, if not ſooner diſſolved by the royal prerogative.

We ſhall conclude this article with an account of ſome general forms not taken notice of under any of the above heads.

In the houſe of lords, the princes of the blood ſit by themſelves on the ſides of the throne; at the wall, on the king's right hand, the two archbiſhops ſit by themſelves on a form. Below them, the biſhops of London, Durham, and Wincheſter, and all the other biſhops, ſit according to the priority of their conſecration. On the king's left hand the lord-treaſurer, lord preſident, and lord privy-ſeal, ſit upon forms above all dukes, except the royal blood; then the dukes, marquiſſes, and earls, according to their creation. Acroſs the room are wool-ſacks, continued from an ancient cuſtom; and the chancellor, or keeper, being of courſe the ſpeaker of the houſe of lords, ſits on the firſt wool-ſack before the throne, with the great ſeal or mace lying by him; below theſe are forms for the viſcounts and barons. On the other wool-ſacks are ſeated the judges, maſters in chancery, and king's council, who are only to give their advice in points of law: but they all ſtand up till the king gives them leave to ſit.

The commons ſit promiſcuouſly; only the ſpeaker has a chair at the upper end of the houſe, and the clerk and his aſſiſtant ſit at a table near him.

When a member of the houſe of commons ſpeaks, he ſtands up uncovered, and directs his ſpeech to the ſpeaker only. If what he ſays be anſwered by another, he is not allowed to reply the ſame day, unleſs perſonal reflections have been caſt upon him: but when the commons, in order to have a greater freedom of debate, have reſolved themſelves into a committee of the whole houſe, every member may ſpeak to a queſtion as often as he thinks neceſſary. In the houſe of lords they vote, beginning at the puiſne, or loweſt baron, and ſo up orderly to the higheſt, every one anſwering, *Content* or *Not content*. In the houſe of commons they vote by *yeas* and *nays*; and if it be dubious which are the greater number, the houſe divides. If the queſtion be about bringing any thing into the houſe, the *yeas* go out; but if it be about any thing the houſe already has, the *nays* go out. In all diviſions the ſpeaker appoints four tellers, two of each opinion. In a committee of the whole houſe, they divide by changing ſides, the *yeas* taking the right and the *nays* the left of the chair; and then there are but two tellers. If a bill paſs one houſe, and the other demur to it, a conference is demanded in the painted chamber, where certain members are deputed from each houſe; and here the lords ſit covered, and the commons ſtand bare, and debate the caſe. If they diſagree, the affair is null; but if they agree, this, with the other bills that have paſſed both houſes, is brought down to the king in the houſe of lords, who comes thither clothed in his royal robes; before him the clerk of the parliament reads the title of each bill, and as he reads, the clerk of the crown pronounces the royal aſſent or diſſent. If it be a public bill, the royal aſſent is given in theſe words, *Le roy le vaut*, "The king will have it ſo;" if private, *Soi fait comme il eſt deſiré*, "Let the requeſt be complied with: if the king refuſes the bill, the anſwer is, *Le roy s'aviſera*, "The king will think of it;" and if it be a money-bill, the anſwer is, *Le roy remercie ſes loyaux ſujets, accepte leur benevolence, & auſſi le veut;* "The king thanks his loyal ſubjects, accepts their benevolence, and therefore grants his conſent."

High Court of PARLIAMENT, is the ſupreme court in the kingdom, not only for the making, but alſo for the execution, of laws; by the trial of great and enormous offenders, whether lords or commoners, in the method of parliamentary impeachment. As for acts of parliament to attaint particular perſons of treaſon or felony, or to inflict pains and penalties, beyond or contrary to the common law, to ſerve a ſpecial purpoſe, we ſpeak not of them; being to all intents and purpoſes new laws, made *pro re nata*, and by no means an execution of ſuch as are already in being. But an impeachment before the lords by the commons of Great Britain, in parliament, is a proſecution of the already known and eſtabliſhed law, and has been frequently put in practice; being a preſentment to the moſt high and ſupreme court of criminal juriſdiction by the moſt ſolemn grand inqueſt of the whole kingdom.

dom. A commoner cannot, however, be impeached before the lords for any capital offence, but only for high miſdemeſnors; a peer may be impeached for any crime. And they uſually (in caſe of an impeachment of a peer for treaſon) addreſs the crown to appoint a lord high ſteward, for the greater dignity and regularity of their proceedings; which high ſteward was formerly elected by the peers themſelves, though he was generally commiſſioned by the king; but it hath of late years been ſtrenuouſly maintained, that the appointment of an high ſteward in ſuch caſes is not indiſpenſably neceſſary, but that the houſe may proceed without one. The articles of impeachment are a kind of bills of indictment, found by the houſe of commons, and afterwards tried by the lords; who are in caſes of miſdemeſnors conſidered not only as their own peers, but as the peers of the whole nation. This is a cuſtom derived to us from the conſtitution of the ancient Germans; who in their great councils ſometimes tried capital accuſations relating to the public: *Licet apud concilium accuſare quoque, et diſcrimen capitis intendere.* And it has a peculiar propriety in the Engliſh conſtitution; which has much improved upon the ancient model imported hither from the continent. For though in general the union of the legiſlative and judicial powers ought to be moſt carefully avoided, yet it may happen that a ſubject, intruſted with the adminiſtration of public affairs, may infringe the rights of the people, and be guilty of ſuch crimes as the ordinary magiſtrate either dares not or cannot puniſh. Of theſe the repreſentatives of the people, or houſe of commons, cannot properly judge; becauſe their conſtituents are the parties injured, and can therefore only impeach. But before what court ſhall this impeachment be tried? Not before the ordinary tribunals, which would naturally be ſwayed by the authority of ſo powerful an accuſer. Reaſon therefore will ſuggeſt, that this branch of the legiſlature, which repreſents the people, muſt bring its charge before the other branch, which conſiſts of the nobility, who have neither the ſame intereſts, nor the ſame paſſions, as popular aſſemblies. This is a vaſt ſuperiority which the conſtitution of this iſland enjoys over thoſe of the Grecian or Roman republics; where the people were at the ſame time both judges and accuſers. It is proper that the nobility ſhould judge, to inſure juſtice to the accuſed; as it is proper that the people ſhould accuſe, to inſure juſtice to the commonwealth. And therefore, among other extraordinary circumſtances attending the authority of this court, there is one of a very ſingular nature, which was inſiſted on by the houſe of commons in the caſe of the earl of Danby in the reign of Charles II. and is now enacted by ſtatute 12 & 13 W. III. c. 2. that no pardon under the great ſeal ſhall be pleadable to an impeachment by the commons of Great Britain in parliament.

Parliaments *of France*, are ſovereign courts eſtabliſhed by the king, finally to determine all diſputes between particular perſons, and to pronounce on appeals from ſentences given by inferior judges. There are ten of theſe parliaments in France, of which that of Paris is the chief, its privileges and juriſdiction being of the greateſt extent. It conſiſts of ſix chambers, viz. the grand chamber, where cauſes of audiences are pleaded; and five chambers of inqueſt, where proceſſes are adjudged in writing. This parliament enjoys the privileges of verifying and regiſtering the king's arrets or edicts, without which thoſe edicts are of little or no value.

Parliament *of Sweden*, conſiſts of four eſtates, with the king at their head: Theſe eſtates are, 1. The nobility and repreſentatives of the gentry; with whom the colonels, lieutenant-colonels, majors, and captains of every regiment, ſit and vote. 2. The clergy; one of which body is elected from every rural deanry of ten pariſhes; who, with the biſhops and ſuperintendents, amount to about two hundred. 3. The burghers, elected by the magiſtrates and council of every corporation as their repreſentatives, of whom their are four for Stockholm, and two for every other town, amounting in the whole to about an hundred and fifty. 4. The peaſants, choſen by the peaſants out of every diſtrict; who chooſe one of their own rank, and not a gentleman, to repreſent them: theſe amount to about two hundred and fifty.

All theſe generally meet at Stockholm: and after the ſtate-affairs have been repreſented to them from the throne, they ſeparate, and ſit in four ſeveral chambers or houſes, in each of which affairs are carried on by majority of votes; and every chamber has a negative in the paſſing any law.

PARMA, an ancient, rich, populous, and handſome town of Italy, capital of the duchy of the ſame name, with a citadel, a biſhop's ſee, and an univerſity. It has a magnificent cathedral, and the largeſt opera-houſe in Europe, which has ſeats for 8000 people; but as it required a vaſt number of candles, which occaſioned great expence, they have contrived another which has room for 2000 ſpectators. The dome and the church of St John are painted by the famous Corregio, who was a native of this place. Don Carlos, king of the two Sicilies, carried away the library to Naples, which contained 18,000 volumes, and a very valuable cabinet of curioſities, as alſo the rich collection of medals. The citadel, which is very near the city, is built in the ſame taſte as that at Antwerp. In 1734 there was a bloody battle fought here; and in 1741, by the treaty of Aix-la-Chapelle, the duchies of Parma, Placentia, and Guaſtalla, were given to Don Philip, brother to Don Carlos abovementioned. It is 30 miles ſouth-eaſt of Cremona, and 30 ſouth-eaſt of Milan. E. Long. 10. 51. N. Lat. 44. 50.

Parma, the duchy of a province of Italy, bounded on the north by the Po; on the north-eaſt, by the Mantuan; on the eaſt, by the duchy of Modena; on the ſouth, by Tuſcany; and on the weſt, by the duchy of Placentia. The air is very wholeſome, on which account the inhabitants live to a great age. The ſoil is very fertile in corn, wine, oil, and hemp; the paſtures feed a great number of cattle, and the cheeſe was in very high eſteem. Here are conſiderable mines of copper and ſilver, and plenty of truffles, which many are very fond of.

PARMEGIANO, a celebrated painter, whoſe true name was Franceſco Mazzuoli; but he received the former from the city of Parma, where he was born, in 1504. He was brought up under his two uncles, and was an eminent painter when but ſixteen years of age. He was famous all over Italy at nineteen; and at twenty-three performed ſuch wonders, that when the general of the emperor Charles V. took Rome by ſtorm, ſome of the common ſoldiers having, in ſacking the town, broke into his apartments, found him intent upon his work, and were inſtantly ſo ſtruck with the beauty of his pieces, that inſtead of involving him in the plunder and deſtruction in which they were then employed, they reſolved to protect him from all manner of violence; which they actually performed. His works are diſtinguiſhed by the beauty of the colouring, the invention, and drawing. His figures are ſpirited and graceful, particularly with reſpect to the choice of attitude, and in their dreſſes. He alſo excelled in muſic, in which he much delighted. His principal works are at Parma, where he lived for ſeveral years in great reputation; till unhappily he involved himſelf in ruin, by ſpending a conſiderable part of his time and fortune in ſearch of the philoſopher's ſtone; and died poor in 1540.

There are extant many valuable prints made by this maſter, not only in chiaro oſcuro, but alſo in etching with aqua-fortis, of which he is ſaid to be the inventor, or at leaſt the firſt who practiſed the art of etching in Italy.

PARNASSIA, graſs of Parnaſſus; a genus of the tetragynia order, belonging to the pentandria claſs of plants. There is but one ſpecies, having a ſtalk about a foot high, angular, and often a little twiſted, bearing a ſingle white flower at top. The flowers are very beautifully ſtreaked with yellow; ſo that though it is a common plant, growing naturally in moiſt paſtures, it is frequently admitted into gardens.

PARNASSUS, (Strabo, Pindar, Virgil), a mountain of Phocis, near Delphi, and the mounts Cithæron and Helicon, with two tops, (Ovid, Lucan); the one called *Cirrha*, ſacred to Apollo; and the other, *Niſa*, ſacred to Bacchus, (Juvenal). It was covered with bay trees, (Virgil); and originally called *Larnaſſus*, from Deucalion's larnax or ark, thither conveyed by the flood, (Stephanus, Scholiaſt on Apollonius); after the flood, *Parnaſſus;* from Har Nahas, changing the *h* into *p*, the hill of divination or augury, Peucerus; the oracle of Delphi ſtanding at its foot.

PARNELL (Dr Thomas), a very ingenious divine and poet in the early part of this century. He was archdeacon of Clogher, and the intimate friend of Mr Pope; who publiſhed his works, with an elegant copy of recommendatory verſes prefixed. He died in 1718, aged 39.

PARODY, a popular maxim, adage, or proverb.

Parody, is alſo a poetical pleaſantry, conſiſting in applying the verſes written on one ſubject, by way of ridicule, to another; or in turning a ſerious work into a burleſque, by affecting to obſerve as near as poſſible the ſame rhimes, words, and cadences.

PAROLE, in a military ſenſe, the promiſe made by a priſoner of war, when he has leave to go any where, of returning at a time appointed, if not exchanged.

Parole, means alſo a word given out every day in orders by the commanding officer, both in camp and garriſon, in order to know friends from enemies.

PARONOMASIA, in rhetoric, a pun; or a figure whereby words nearly alike in ſound, but of very different meanings, are affectedly or deſignedly uſed. See Oratory, n° 76.

PAROS, (anc. geog.), an iſland of the Ægean ſea, one of the Cyclades, with a ſtrong cognominal town, 38 miles diſtant from Delos, (Pliny, Nepos). Anciently called *Pactye* and *Minoa*, (Pliny); alſo *Demetrias*, *Zacynthus*, *Hyria*, *Hyleeſſa*, and *Cabarnis*, (Nicanor). The country of Archilochus, the Iambic poet, (Strabo). An iſland famous for its white marble, (Virgil, Horace, Ovid), called *lychnites*, becauſe dug with lamps, (Pliny).

PAROTIDES, in anatomy. See there, n° 391.

PAROXYSM, in medicine, the ſevere fit of a diſeaſe, under which it grows higher or exaſperated; as of the gout, &c.

PARR (Catharine), was the eldeſt daughter of Sir Thomas Parr of Kendall. She was firſt married to John Nevil, lord Latymer; after whoſe death ſhe ſo captivated her amorous ſovereign, that he raiſed her to the throne. The royal nuptials were ſolemniſed at Hampton Court on the 12th of July 1543. Being religiouſly diſpoſed, ſhe was, in the early part of her life, a zealous obſerver of the Romiſh rites and ceremonies; but, in the dawning of the Reformation, ſhe became as zealous a promoter of the Lutheran doctrine; yet with ſuch prudence and circumſpection as her perilous ſituation required. Nevertheleſs, we are told, that ſhe was in great danger of falling a ſacrifice to the Popiſh faction, the chief of whom was biſhop Gardiner: he drew up articles againſt her, and prevailed on the king to ſign a warrant to remove her to the Tower. This warrant was, however, accidendentally dropped, and immediately conveyed to her majeſty. What her apprehenſions muſt have been on this occaſion, may be eaſily imagined. She knew the monarch, and ſhe could not help recollecting the fate of his former queens. A ſudden illneſs was the natural conſequence. The news of her indiſpoſition brought the king to her apartment. He was laviſh in expreſſions of affection, and ſent her a phyſician. His majeſty being ſoon after alſo ſomewhat indiſpoſed, ſhe prudently returned the viſit; with which the king ſeemed pleaſed, and began to talk with her on religious ſubjects, propoſing certain queſtions, concerning which he wanted her opinion. She anſwered, that ſuch profound ſpeculations were not ſuited to her ſex; that it belonged to the huſband to chooſe principles for his wife; the wife's duty was, in all caſes, to adopt implicitly the ſentiments of her huſband: and as to herſelf, it was doubly her duty, being bleſſed with a huſband who was qualified, by his judgment and learning, not only to chooſe principles for his own family, but for the moſt wiſe and knowing of every nation. "Not ſo, by St Mary," replied the king; "you are now become a doctor, Kate, and better fitted to give than receive inſtruction." She meekly replied, that ſhe was ſenſible how little ſhe was entitled to theſe praiſes; that though ſhe uſually declined not any converſation, however ſublime, when propoſed by his Majeſty, ſhe well knew that her conceptions could ſerve to no other purpoſe than to give him a little momentary amuſement; that ſhe found the converſation a little apt to languiſh when not revived by ſome oppoſition, and ſhe had ventured ſometimes to feign a contrariety of ſentiments, in order to give him the pleaſure of refuting her; and that ſhe alſo propoſed, by this innocent artifice, to engage him into topics whence ſhe had obſerved by frequent experience, that ſhe reaped profit and inſtruction. "And is it ſo, ſweetheart?" replied the king, "then we are perfect friends again." He embraced her with great affection, and ſent her away with aſſurances of his protection and kindneſs.

The time being now come when ſhe was to be ſent to the Tower, the king, walking in the garden, ſent for the queen, and met her with great good humour; when lo the chancellor, with forty of the guards, approached. He fell upon his knees, and ſpoke ſoftly with the king, who called him knave, arrant knave, beaſt, fool, and commanded him inſtantly to depart. Henry then returned to the queen, who ventured to intercede for the chancellor: "Ah poor ſould!" ſaid the king, "thou little knoweſt how evil he deſerveth this grace at thy hands. Of my word, ſweetheart, he hath been toward thee an arrant knave; and ſo let him go." The king died in January 1547, juſt three years and a half after his marriage with this ſecond Catharine; who in a ſhort time was again eſpouſed to Sir Thomas Seymour lord-admiral of England; for, in September 1548, ſhe died in childbed. The hiſtorians of this period generally inſinuate, that ſhe was poiſoned by her huſband, to make way for his marriage with the lady Elizabeth.

That Catharine Parr was beautiful, is beyond a doubt: that ſhe was pious and learned, is evident from her writings: and that her prudence and ſagacity were not inferior to her other accompliſhments, may be concluded from her holding up the paſſion of a capricious tyrant as a ſhield againſt her enemies; and that at the latter end of his days, when his paſſions were enfeebled by age, and his peeviſh auſterity increaſed by diſeaſe. She wrote, 1. Queen Catharine Parr's lamentation of a ſinner, bewailing the ignorance of her blind life; Lond. 8vo, 1548, 1563. 2. Prayers or meditations, wherein the mynd is ſtirred patiently to ſuffre all afflictions here, to ſet at nought the vaine proſperitee of this worlde, and always to long for the everlaſtynge felicitee. Collected out of holy workes, by the moſt virtuous and gracious princeſſe Katharine, queene of Englande, France, and Irelande. Printed by John Wayland, 1545, 4to,—1561, 12mo. 3. Other Meditations, Prayers, Letters, &c. unpubliſhed.

Parr (Thomas), or *Old Parr*, a remarkable Engliſhman, who lived in the reigns of ten kings and queens; married a ſecond wife when he was 120, and had a child by her. See Longevity.

PARRELS, in a ſhip, are frames made of trucks, ribs, and ropes, which having both their ends faſtened to the yards, are ſo contrived as to go round about the maſts, that the yards by their means may go up and down upon the maſt. Theſe alſo, with the breaſt-ropes, faſten the yards to the maſts.

PARRHESIA. See Oratory, n° 88.

PARRICIDE, the murder of one's parents or children. By the Roman law, it was puniſhed in a much ſeverer manner than any other kind of homicide. After being ſcourged, the delinquents were ſewed up in a leathern ſack, with a live dog, a cock, a viper, and an ape, and ſo caſt into the ſea. Solon, it is true, in his laws, made none againſt parricide; apprehending it impoſſible that one ſhould be guilty of ſo unnatural a barbarity. And the Perſians, according to Herodotus, entertained the ſame notion, when they adjudged all perſons who killed their reputed parents to be baſtards. And upon ſome ſuch reaſon as this muſt we account for the omiſſion of an exemplary puniſhment for this crime in our Engliſh laws; which treat it no otherwiſe than as ſimple murder, unleſs the child was alſo the ſervant of the parent.

For though the breach of natural relation is unobſerved, yet the breach of civil or eccleſiaſtic connections, when coupled with murder, denominates it a new offence; no leſs than a ſpecies of treaſon called *parva proditio*, or *petit treaſon:* which, however, is nothing elſe but an aggravated degree of murder; although, on account of the violation of private allegiance, it is ſtigmatized as an inferior ſpecies of treaſon. And thus, in the ancient Gothic conſtitution, we find the breach both of natural and civil relations ranked in the ſame claſs with crimes againſt the ſtate and ſovereign.

PARROT, in ornithology. See Psittacus.

PARSLEY, in botany. See Apium.

PARSNEP, in botany. See Pastinaca.

PARSON *and* Vicar. A parſon, *perſona eccleſiæ*, is one that hath full poſſeſſion of all the rights of a parochial church. He is called parſon, *perſona*, becauſe by his perſon the church, which is an inviſible body, is repreſented; and he is in himſelf a body corporate, in order to protect and defend the rights of the church (which he perſonates) by a perpetual ſucceſſion. He is ſometimes called the *rector* or *governor* of the church: but the appellation of *parſon* (however it may be depreciated by familiar, clowniſh, and indiſcriminate uſe) is the moſt legal, moſt beneficial, and moſt honourable title that a pariſh-prieſt can enjoy; becauſe ſuch a one (Sir Edward Coke obſerves) and he only, is ſaid *vicem ſeu perſonam eccleſiæ gerere.* A parſon has, during his life, the freehold in himſelf of the parſonage-houſe, the glebe, the tithes, and other dues. But theſe are ſometimes *appropriated;* that is to ſay, the benefice is perpetually annexed to ſome ſpiritual corporation, either ſole or aggregate, being the patron of the living; whom the law eſteems equally capable of providing for the ſervice of the church as any ſingle private clergyman *.

Blackſtone's Comment.

* See the article Ap- *propriati*

The appropriating corporations, or religious houſes, were wont to depute one of their own body to perform divine ſervice, and adminiſter the ſacraments, in thoſe pariſhes of which the ſociety was thus the parſon. This officiating miniſter was in reality no more than a curate, deputy, or vicegerent of the appropriator, and therefore called *vicarius*, or "vicar." His ſtipend was at the diſcretion of the appropriator, who was, however, bound of common right to find ſomebody, *qui illi de temporalibus, epiſcopo de ſpiritualibus, debeat reſpondere.* But this was done in ſo ſcandalous a manner, and the pariſhes ſuffered ſo much by the neglect of the appropriators, that the legiſlature was forced to interpoſe: and accordingly it is enacted, by ſtatute 15 Ric. II. c. 6. that in all appropriations of churches the dioceſan biſhop ſhall ordain (in proportion to the value of the church) a competent ſum to be diſtributed among the poor pariſhioners annually; and that the vicarage ſhall be ſufficiently endowed. It ſeems the pariſh were frequently ſufferers, not only by the want of divine ſervice, but alſo by with-holding thoſe alms for which, among other purpoſes, the payment of tithes was originally impoſed: and therefore in this act a penſion is directed to be diſtributed among the poor parochians, as well as a ſufficient ſtipend to the vicar. But he, being liable to be removed at the pleaſure of the appropriator, was not likely to inſiſt too rigidly on the legal ſufficiency of the ſtipend; and therefore, by ſtatute 4 Hen. IV. c. 12. it is ordained, that the vicar ſhall be a ſecular perſon, not a member of any religious houſe; that he ſhall be vicar perpetual, not removable at the caprice of the monaſtery; and that he ſhall be canonically inſtituted and inducted, and be ſufficiently endowed, at the diſcretion of the ordinary; for theſe three expreſs purpoſes, to do divine ſervice, to inform the people, and to keep hoſpitality. The endowments, in conſequence of theſe ſtatutes, have uſually been by a portion of the glebe or land belonging to the parſonage, and a particular ſhare of the tithes, which the appropriators found it moſt troubleſome to collect, and which are therefore generally called *privy*, or *ſmall tithes*; the greater, or predial tithes, being ſtill reſerved to their own uſe. But one and the ſame rule was not obſerved in the endowment of all vicarages. Hence ſome are more liberally, and ſome more ſcantily, endowed: and hence the tithes of many things, as wood in particular, are in ſome pariſhes rectorial, and in ſome vicarial tithes.

The diſtinction therefore of a parſon and vicar is this: The parſon has for the moſt part the whole right to all the eccleſiaſtical dues in his pariſh; but a vicar has generally an appropriator over him, entitled to the beſt part of the profits, to whom he is in effect perpetual curate, with a ſtanding ſalary. Though in ſome places the vicarage has been conſiderably augmented by a large ſhare of the great tithes; which augmentations were greatly aſſiſted by the ſtatute 27 Car. II. c. 8. enacted in favour of poor vicars and curates, which rendered ſuch temporary augmentations (when made by the appropriators) perpetual.

The method of becoming a parſon or vicar is much the ſame. To both there are four requiſites neceſſary; holy orders, preſentation, inſtitution, and induction. The method of conferring the holy orders of deacon and prieſt, according to the liturgy and canons, is foreign to the preſent purpoſe; any farther than as they are neceſſary requiſites to make a complete parſon or vicar. By common law, a deacon, of any age, might be inſtituted and inducted to a parſonage or vicarage: but it was ordained, by ſtatute 13 Eliz. c. 12. that no perſon under twenty-three years of age, and in deacon's orders, ſhould be preſented to any benefice with cure; and if he were not ordained prieſt within one year after his induction, he ſhould be *ipſo facto* deprived: and now, by ſtatute 13 and 14 Car. II. c. 4. no perſon is capable to be admitted to any benefice, unleſs he hath been firſt ordained a prieſt; and then he is, in the language of the law, a clerk in orders. But if he obtains orders, or a licence to preach, by money or corrupt practices, (which ſeems to be the true, though not the common, notion of ſimony), the perſon giving ſuch orders forfeits 40 l. and the perſon receiving, 10 l. and is incapable of any eccleſiaſtical preferment for ſeven years after.

Any clerk may be preſented to a parſonage or vicarage; that is, the patron, to whom the advowſon of the church belongs, may offer his clerk to the biſhop of the dioceſe to be inſtituted. But when he is preſented, the biſhop may refuſe him upon many accounts. As, 1. If the patron is excommunicated, and remains in contempt 40 days; or, 2. If the clerk be unfit: which unfitneſs is of ſeveral kinds. Firſt, with regard to his perſon; as if he be a baſtard, an outlaw, an excommunicate, an alien, under age, or the like. Next, with regard to his faith or morals; as for any particular hereſy, or vice that is *malum in ſe*; but if the biſhop alleges only in generals, as that he is *ſchiſmaticus inveteratus*, or objects a fault that is *malum prohibitum* merely, as haunting taverns, playing at unlawful games, or the like, it is not good cauſe of refuſal. Or, laſtly, the clerk may be unfit to diſcharge the paſtoral office for want of learning. In any of which caſes, the biſhop may refuſe the clerk. In caſe the refuſal is for hereſy, ſchiſm, inability of learning, or other matter of eccleſiaſtical cognizance, there the biſhop muſt give notice to the patron of ſuch his cauſe of refuſal, who being uſually a layman, is not ſuppoſed to have knowledge of it; elſe he cannot preſent by lapſe; but if the cauſe be temporal, there he is not bound to give notice.

If an action at law be brought by the patron againſt the biſhop for refuſing his clerk, the biſhop muſt aſſign the cauſe. If the cauſe be of a temporal nature, and the fact admitted, (as, for inſtance, outlawry), the judges of the king's courts muſt determine its validity, or whether it be ſufficient cauſe of refuſal: but if the fact be denied, it muſt be determined by a jury. If the cauſe be of a ſpiritual nature, (as hereſy, particularly alleged), the fact, if denied, ſhall alſo be determined by a jury: and if the fact be admitted or found, the court, upon conſultation and advice of learned divines, ſhall decide its ſufficiency. If the cauſe be want of learning, the biſhop need not ſpecify in what points the clerk is deficient, but only allege that he is deficient; for the ſtatute 9 Edw. II. ſt. 1. c. 13. is expreſs, that the examination of the fitneſs of a perſon preſented to a benefice belongs to the eccleſiaſtical judge. But becauſe it would be nugatory in this caſe to demand the reaſon of refuſal from the ordinary, if the patron were bound to abide by his determination, who has already pronounced his clerk unfit; therefore if the biſhop returns the clerk to be *minus ſufficiens in literatura*, the court ſhall write to the metropolitan to re-examine him, and certify his qualifications; which certificate of the archbiſhop is final.

If the biſhop hath no objections, but admits the patron's preſentation, the clerk ſo admitted is next to be inſtituted by him; which is a kind of inveſtiture of the ſpiritual part of the benefice; for by inſtitution, the care of the ſouls of the pariſh is committed to the charge of the clerk. When a vicar is inſtituted, he (beſides the uſual forms) takes, if required by the biſhop, an oath of perpetual reſidence; for the maxim of law is, that *vicarius non habet vicarium*: and as the non-reſidence of the appropriators was the cauſe of the perpetual eſtabliſhment of vicarages, the law judges it very improper for them to defeat the end of their conſtitution, and by abſence to create the very miſchief which they were appointed to remedy; eſpecially as, if any profits are to ariſe from putting in a curate and living at a diſtance from the pariſh, the appropriator, who is the real parſon, has undoubtedly the elder title to them. When the ordinary is alſo the patron, and confers the living, the preſentation and inſtitution are one and the ſame act, and are called a *collation to a benefice*. By inſtitution or collation the church is full, ſo that there can be no freſh preſentation till another vacancy, at leaſt in the caſe of a common patron; but the church is not full againſt the king till induction: nay, even if a clerk is inſtituted upon the king's preſentation, the crown may revoke it before induction, and preſent another clerk. Upon inſtitution alſo the clerk may enter on the parſonage-houſe and glebe, and take the tithes; but he cannot grant or let them, or bring an action for them, till induction. See INDUCTION.

For the rights of a parſon or vicar, in his tithes and eccleſiaſtical dues, ſee TITHES. As to his duties, they are ſo numerous, that it is impracticable to recite them here with any tolerable conciſeneſs or accuracy; but the reader who has occaſion may conſult *Bp Gibſon's Codex*, and *Burn's Eccleſiaſtical Law*. We ſhall therefore only juſt mention the article of reſidence, upon the ſuppoſition of which the law doth ſtyle every parochial miniſter an incumbent. By ſtatute 21 Hen. VIII. c. 13. perſons willingly abſenting themſelves from their benefices, for one month together, or two months in the year, incur a penalty of 5 l. to the king, and 5 l. to any perſon that will ſue for the ſame; except chaplains to the king, or others therein mentioned, during their attendance in the houſehold of ſuch as retain them: and alſo except all heads of houſes, magiſtrates, and profeſſors in the univerſities, and all ſtudents under forty years of age reſiding there, *bona fide*, for ſtudy. Legal reſidence is not only in the pariſh, but alſo in the parſonage-houſe; for it hath been reſolved, that the ſtatute intended reſidence, not only for ſerving the cure and for hoſpitality, but alſo for maintaining the houſe, that the ſucceſſor alſo may keep hoſpitality there.

We have ſeen that there is but one way whereby one may become a parſon or vicar: there are many ways by which one may ceaſe to be ſo. 1. By death. 2. By ceſſion, in taking another benefice; for by ſtatute 21 Hen. VIII. c. 13. if any one having a benefice of 8 l. *per annum*, or upwards, in the king's books, (according to the preſent valuation), accepts any other, the firſt ſhall be adjudged void, unleſs he obtains a diſpenſation; which no one is entitled to have but the chaplains of the king and others therein mentioned, the brethren and ſons of lords and knights, and doctors and bachelors of divinity and law, admitted by the univerſities of this realm. And a vacancy thus made for want of a diſpenſation, is called *ceſſion*. 3. By conſecration; for, as was mentioned before, when a clerk is promoted to a biſhopric, all his other preferments are void the inſtant that he is conſecrated. But there is a method, by the favour of the crown, of holding ſuch livings *in commendam*. *Commenda*, or *eccleſia commendata*, is a living commended by the crown to the care of a clerk, to hold till a proper paſtor is provided for it. This may be temporary for one, two, or three years, or perpetual, being a kind of diſpenſation to avoid the vacancy of the living, and is called a *commenda retinere*. There is alſo a *commenda recipere*, which is to take a benefice *de novo* in the biſhop's own gift, or the gift of ſome other patron conſenting to the ſame; and this is the ſame to him as inſtitution and induction are to another clerk. 4. By reſignation. But this is of no avail till accepted by the ordinary, into whoſe hands the reſignation muſt be made. 5. By deprivation, either by canonical cenſures, or in purſuance of divers penal ſtatutes, which declare the benefice void, for ſome nonfeaſance or neglect, or elſe ſome malefeaſance or crime: as for ſimony; for maintaining any doctrine in derogation of the king's ſupremacy, or of the thirty-nine articles, or of the book of common-prayer; for neglecting after inſtitution to read the liturgy and articles in the church, or make the declarations againſt popery, or take the abjuration-oath; for uſing any other form of prayer than the liturgy of the church of England; or for abſenting himſelf 60 days in one year from a benefice belonging to a popiſh patron, to which the clerk was preſented by either of the univerſities: in all which, and ſimilar caſes, the benefice is *ipſo facto* void, without any formal ſentence of deprivation.

PARSONAGE, a rectory, or pariſh-church, endowed with a glebe, houſe, lands, tithes, &c. for the maintenance of a miniſter, with cure of ſouls within ſuch pariſh. See PARSON.

PARSONS, or PERSONS, (Robert), an eminent writer of the church of Rome, was born at Nether-Stowey, near Bridgewater, in Somerſetſhire, in 1546, and educated at Baliol college, Oxford, where he diſtinguiſhed himſelf as a zealous Proteſtant and an acute diſputant; but being charged by the ſociety with incontinency and embezzling the college money, he went to Flanders, and declared himſelf a Catholic. After travelling to ſeveral other places, he effected the eſtabliſhment of the Engliſh ſeminary at Rome, and procured father Allen to be choſen rector of it. He himſelf was appointed the head of the miſſion to England, in order to dethrone Queen Elizabeth, and if poſſible extirpate the Proteſtant religion. He accordingly came over to this kingdom in 1580, and took ſome bold ſteps towards accompliſhing his purpoſe, in which he concealed himſelf with great art, travelling about the country to gentlemens houſes, diſguiſed in the habit, ſometimes of a ſoldier, ſometimes of a gentleman, and at other times like a miniſter or an apparitor; but father Campian being ſeized and committed to priſon, our author eſcaped out of England for fear of the ſame fate, and went to Rome, where he was made rector of the Engliſh ſeminary. He had long entertained the moſt ſanguine hopes of converting to the popiſh faith the young king of Scots, which he conſidered as the beſt and moſt effectual means of bringing over his ſubjects to the ſame religious principles; but finding it impoſſible to ſucceed in his deſign, he publiſhed, in 1594, his celebrated book, under the feigned name of *Doleman*, in order to overthrow, as far as lay in his power, the title of that prince to the crown of England. He died at Rome in 1610, and was buried in the chapel of the Engliſh college,

college. Beſides the book already mentioned, he wrote, 1 A defence of the Catholic hierarchy. 2. The liturgy of the ſacrament of the maſs. 3. A memorial for the Reformation; and ſeveral other tracts.

PART, a portion of ſome whole, conſidered as divided or diviſible.

Aliquot PART, is a quantity which, being repeated any number of times, becomes equal to an integer. Thus 6 is an aliquot part of 24, and 5 an aliquot part of 30, &c.

Aliquant PART, is a quantity which, being repeated any number of times, becomes always either greater or leſs than the whole. Thus 5 is an aliquant part of 17, and 9 an aliquant part of 10, &c.

The aliquant part is reſolvible into aliquot parts. Thus 15, an aliquant part of 20, is reſolvible into $10\frac{1}{2}$, and 5 a fourth part of the ſame.

PARTS *of ſpeech*, in grammar, are all the ſorts of words which can enter the compoſition of a diſcourſe. See GRAMMAR.

PARTERRE, in gardening, a level diviſion of ground, which for the moſt part faces the ſouth, or beſt front of a houſe, and is generally furniſhed with ever-greens, flowers, &c. There are two kinds of theſe, the plain ones and the parterres of embroidery.

Plain parterres are moſt valuable in England, becauſe of the firmneſs of the Engliſh graſs turf, which is ſuperior to that of any other part of the world; and the parterres of embroidery are cut into ſhell and ſcroll work, with alleys between them. An oblong, or long ſquare, is accounted the moſt proper figure for a parterre; and a parterre ſhould indeed be always twice as long as it is broad, becauſe, according to the known laws of perſpective, a long ſquare always ſinks to a ſquare; and an exact ſquare always appears leſs than it really is. As to the breadth of a parterre, it is to be proportionable to the front of the houſe; but leſs than 100 feet in breadth is too little.

There ſhould be on each ſide the parterre a terras-walk raiſed for a view, and the flat of the parterre between the terraſes ſhould never be more than 300 feet, at the utmoſt, in breadth, and about 140 feet in width, with twice and a half that in length, is eſteemed a very good ſize and proportion.

PARTHIA, a celebrated empire of antiquity, bounded on the weſt by Media, on the north by Hyrcania, on the eaſt by Aria, on the ſouth by Carmania the deſart; ſurrounded on every ſide by mountains, which ſtill ſerve as a boundary, though its name is now changed, having obtained that of *Eyrac* or *Arak*; and, to diſtinguiſh it from Chaldæa, that of *Eyrac Agami*. By Ptolemy it is divided into five diſtricts, viz. Caminſine, or Gamiſene, Parthyene, Choroane, Atticene, and Tabiene. The ancient geographers enumerate a great many cities in this country. Ptolemy in particular reckons 25 large cities; and it certainly muſt have been very populous, since we have accounts of 2000 villages, beſides a number of cities, in this diſtrict being deſtroyed by earthquakes. Its capital was named *Hecatompolis*, from the circumſtance of its having 100 gates. It was a noble and magnificent place; and, according to ſome, it ſtill remains under the name of *Iſpahan*, the capital of the preſent Perſian empire.

1 ent di- ns.

Parthia is by ſome ſuppoſed to have been firſt peopled by the Phetri or Pathri, often mentioned in ſcripture, and will have the Parthians to be deſcended from Pathruſim the ſon of Miſraim. But however true this may be with regard to the ancient inhabitants, yet it is certain, that thoſe Parthians who were ſo famous in hiſtory, deſcended from the Scythians, though from what tribe we are not certainly informed.

2 Whence peopled.

The hiſtory of the ancient Parthians is totally loſt. All that we know about them is, that they were firſt ſubject to the Medes, afterwards to the Perſians, and laſtly to Alexander the Great. After his death the province fell to Seleucus Nicator, and was held by him and his ſucceſſors till the reign of Antiochus Theus, about the year 250 before Chriſt. At this time the Parthians revolted, and choſe one Arſaces for their king. The immediate cauſe of this revolt was the lewdneſs of Agathocles, to whom Antiochus had committed the care of all the provinces beyond the Euphrates. This man made an infamous attempt on Teridates, a youth of great beauty; which ſo enraged his brother Arſaces, that he excited his countrymen to revolt; and before Antiochus had leiſure to attend to the rebellion, it became too powerful to be cruſhed. Seleucus Callinicus, the ſucceſſor of Antiochus Theus, attempted to reduce Arſaces; but the latter having had ſo much time to ſtrengthen himſelf, defeated, and drove his antagoniſt out of the country. Seleucus, however, in a ſhort time, undertook another expedition againſt Arſaces; but was ſtill more unfortunate than he had been in the former, being not only defeated in a great battle, but taken priſoner, and died in captivity. The day on which Arſaces gained this victory was ever after obſerved among the Parthians as an extraordinary feſtival. Arſaces being thus fully eſtabliſhed in his new kingdom, reduced Hyrcania, and ſome other provinces under his power; and was at laſt killed in a battle againſt Arearathes IV. king of Cappadocia. From this prince all the other kings of Parthia took the ſurname of *Arſaces*, as thoſe of Egypt did that of *Ptolemy* from Ptolemy Soter.

3 Cauſe of the Parthian revolt from Antiochus Theus.

Arſaces I. was ſucceeded by his ſon Arſaces II. who, entering Media, made himſelf maſter of that country, while Antiochus the Great was engaged in a war with Ptolemy Euergetes king of Egypt. Antiochus, however, was no ſooner diſengaged from that war, than he marched with all his forces againſt Arſaces, and at firſt drove him quite out of Media. But he ſoon returned with an army of 100,000 foot and 20,000 horſe, with which he put a ſtop to the further progreſs of Antiochus; and a treaty was ſoon after concluded, in which it was agreed, that Arſaces ſhould remain maſter of Parthia and Hyrcania, upon condition of his aſſiſting him in his wars with other nations.

4 Conqueſts of the Parthian monarchs.

Arſaces II. was ſucceeded by his ſon Priapatius, who reigned 15 years, and left three ſons, Phrahates, Mithridates, and Artabanus. Phrahates, the eldeſt, ſucceeded to the throne, and reduced under his ſubjection the Mardi, who had never been conquered by any but Alexander the Great. After him, his brother Mithridates was inveſted with the regal dignity. He reduced the Bactrians, Medes, Perſians, Elymeans, and over-ran in a manner all the eaſt, penetrating beyond the boundaries of Alexander's conqueſts. Demetrius Nicator, who then reigned in Syria, endeavoured to recover thoſe provinces; but his army was entirely deſtroyed, and himſelf taken priſoner, in which ſtate he remained till his death; after which victory Mithridates made himſelf maſter of Babylonia and Meſopotamia, ſo that he now commanded all the provinces from between the Euphrates and the Ganges.

5
Antiochus Sidetes deſtroyed with his whole army.

Mithridates died in the 37th year of his reign, and left the throne to his ſon Phrahates II. who was ſcarce ſettled in his kingdom, when Antiochus Sidetes marched againſt him at the head of a numerous army, under pretence of delivering his brother Demetrius, who was ſtill in captivity. Phrahates was defeated in three pitched battles, in conſequence of which he loſt all the countries conquered by his father, and was reduced within the limits of the ancient Parthian kingdom. Antiochus did not, however, long enjoy his good fortune; for his army, on account of their number, amounting to no fewer than 400,000, being obliged to ſeparate to ſuch diſtances as prevented them, in caſe of any ſudden attack, from joining together, the inhabitants, whom they had moſt cruelly oppreſſed, taking advantage of this ſeparation, conſpired with the Parthians to deſtroy them. This was accordingly executed; and the vaſt army of Antiochus, with the monarch himſelf, were ſlaughtered in one day, ſcarce a ſingle perſon eſcaping to carry the news to Syria. Phrahates, elated with this ſucceſs, propoſed to invade Syria; but in the mean time, happening to quarrel with the Scythians, he was by them cut off with his whole army, and was ſucceeded by his uncle Artabanus.

6
Alliance concluded with the Romans.

The new king enjoyed his dignity but a very ſhort time, being, a few days after his acceſſion, killed in another battle with the Scythians. He was ſucceeded by Pacorus I. who entered into an alliance with the Romans; and he by Phrahates III. This monarch took under his protection Tigranes the ſon of Tigranes the Great, king of Armenia, gave him his daughter in marriage, and invaded the kingdom with a deſign to place the ſon on the throne of Armenia; but on the approach of Pompey he thought proper to retire, and ſoon after ſolemnly renewed the treaty with the Romans.

7
Crœſus reſolves on a war with the Parthians.

Phrahates was murdered by his children Mithridates and Orodes; and ſoon after, the former was put to death by his brother, who thus became ſole maſter of the Parthian empire. In his reign happened the memorable war with the Romans under Craſſus. This was occaſioned not by any breach of treaty on the ſide of the Parthians, but through the ſhameful avarice of Craſſus. The whole Roman empire at that time had been divided between Cæſar, Pompey, and Craſſus; and by virtue of that partition, the eaſtern provinces had fallen to the lot of Craſſus. No ſooner was he inveſted with this dignity, than he reſolved to carry the war into Parthia, in order to enrich himſelf with the ſpoils of that people, who were then looked upon to be very wealthy. Some of the tribunes oppoſed him, as the Parthians had religiouſly obſerved the treaty; but Craſſus having, by the aſſiſtance of Pompey, carried every thing before him, left Rome in the year 55 B. C. and purſued his march to Brunduſium, where he immediately embarked his troops, though the wind blew very high; and after a difficult paſſage, where he loſt many of his ſhips, he reached the ports of Galatia.

8
Plunders the temple at Jeruſalem.

From Galatia Craſſus haſtened to Syria, and paſſing through Judea, plundered the temple of Jeruſalem in his way. He then marched with as great expedition as he could to the river Euphrates, which he croſſed on a bridge of boats; and, entering the Parthian dominions, began hoſtilities. As the enemy had not expected an invaſion, they were quite unprepared for reſiſtance, and therefore Craſſus over-ran all Meſopotamia; and if he had taken advantage of the conſternation which the Parthians were in, might have alſo reduced Babylonia. But inſtead of this, early in the autumn, he repaſſed the Euphrates, leaving only 7000 foot and 1000 horſe to garriſon the places he had reduced; and putting his army into winter-quarters in Syria, gave himſelf totally up to his favourite paſſion of amaſſing money.

Early in the ſpring, the Roman general drew his forces out of their winter-quarters, in order to purſue the war with vigour; but, during the winter, Orodes had collected a very numerous army, and was well prepared to oppoſe him. Before he entered upon action, however, the Parthian monarch ſent ambaſſadors to Craſſus, in order to expoſtulate with him on his injuſtice in attacking an ally of the Roman empire; but Craſſus, without attending to what they ſaid, only returned for anſwer, that "they ſhould have his anſwer at Seleucia."

9
His ſoldie diſheartened.

Orodes, finding that a war was not to be avoided, divided his army into two bodies. One he commanded in perſon, and marched towards Armenia, in order to oppoſe the king of that country, who had raiſed a conſiderable army to aſſiſt the Romans. The other he ſent into Meſopotamia, under the command of Surena or Surenas, a moſt experienced general, by whoſe conduct all the cities which Craſſus had reduced were quickly retaken. On this ſome Roman ſoldiers who made their eſcape, and fled to the camp of Craſſus, filled the minds of his army with terror at the accounts of the number, power, and ſtrength of the enemy. They told their fellow-ſoldiers, that the Parthians were very numerous, brave, and well diſciplined; that it was impoſſible to overtake them when they fled, or eſcape them when they purſued; that their defenſive weapons were proof againſt the Roman darts, and their offenſive weapons ſo ſharp, that no buckler was proof againſt them, &c. Craſſus looked upon all this only as the effects of cowardice; but the common ſoldiers, and even many of the chief officers, were ſo diſheartened, that Caſſius, the ſame who afterwards conſpired againſt Cæſar, and moſt of the legionary tribunes, adviſed Craſſus to ſuſpend his march, and conſider better of the enterpriſe before he proceeded farther in it. But Craſſus obſtinately perſiſted in his former reſolution, being encouraged by the arrival of Artabazus king of Armenia, who brought with him 6000 horſe, and promiſed to ſend 10,000 cuiraſſiers and 30,000 foot, whenever he ſhould ſtand in need of them. At the ſame time, he adviſed him by no means to march his army through the plains of Meſopotamia, but to take his route over the mountains of Armenia. He told him, that as Armenia was a mountainous country, the enemy's cavalry, in which their main ſtrength conſiſted, would there be entirely uſeleſs; and beſides, his army would there be plentifully ſupplied with all manner of neceſſaries: whereas, if he marched by the way of Meſopotamia, he would be perpetually harraſſed by the Parthian horſe, and frequently be obliged to lead his army thro' ſandy deſarts, where he would be diſtreſſed for want of water and all other proviſions. This ſalutary advice, however, was rejected, and Craſſus entered Meſopotamia with an army of about 40,000 men.

10
Betrayed by Abgarus king of Edeſſa.

The Romans had no ſooner croſſed the Euphrates, than Caſſius adviſed his general to advance to ſome of thoſe towns in which the garriſons yet remained, in order to halt and refreſh his troops; or if he did not chooſe to follow this advice, he ſaid that his beſt way would be to march along the banks of the Euphrates to Seleucia; as by this method he would prevent the Parthians from ſurrounding him, at the ſame time that he would be plentifully ſupplied with proviſions from his ſhips. Of this advice Craſſus ſeemed to approve; but was diſſuaded by Abgarus king of Edeſſa, whom the Romans took for an ally, but who was in reality a traitor ſent by Surenas to bring about the deſtruction of the Roman army.

Under the conduct of this faithleſs guide, the Romans entered a vaſt green plain divided by many rivulets. Their march proved very eaſy through this fine country; but the farther they advanced, the worſe the roads became, inſomuch, that they were at laſt obliged to climb up rocky mountains, which brought them to a dry and ſandy plain, where they could neither find food to ſatisfy their hunger, nor water to quench their thirſt. Abgarus then began to be ſuſpected by the tribunes and other officers, who earneſtly intreated Craſſus not to follow him any longer, but to retreat to the mountains; at the ſame time an expreſs arrived from Artabazus, acquainting the Roman general that Orodes had invaded his dominions with a great army, and that he was obliged to keep his troops at home, in order to defend his own dominions. The ſame meſſenger adviſed Craſſus in his maſter's name to avoid by all means the barren plains, where his army would certainly periſh with hunger and fatigue, and by all means to approach Armenia, that they might join their forces againſt the common enemy. But all was to no purpoſe; Craſſus, inſtead of hearkening either to the advice of the king or his own officers, firſt flew into a violent paſſion with the meſſengers of Artabazus, and then told his troops, that they were not to expect the delights of Campania in the moſt remote parts of the world.

Thus they continued their march for ſome days croſs a deſart, the very ſight of which was ſufficient to throw them into the utmoſt deſpair; for they could not perceive, either near them or at a diſtance, the leaſt tree, plant, or brook, not ſo much as an hill, or a ſingle blade of graſs; nothing was to be ſeen all around them, but huge heaps of burning ſand. The Romans had ſcarcely got thro' this deſart, when word was brought them by their ſcouts, that a numerous army of Parthians was advancing full march to attack them; for Abgarus, under pretence of going out on parties, had often conferred with Surenas, and concerted meaſures with him for deſtroying the Roman army. Upon this advice, which occaſioned great confuſion in the camp, the Romans being quite exhauſted and tired out with their long and troubleſome march, Craſſus drew up his men in battalia, following at firſt the advice of Caſſius, who was for extending the infantry as wide as poſſible, that they might take up the more ground, and by that means prevent the enemy from ſurrounding them; but Abgarus aſſuring the proconſul, that the Parthian forces were not ſo numerous as was repreſented, he changed this diſpoſition, and believing only the man who betrayed him, drew up his troops in a ſquare, which faced every way, and had on each ſide 12 cohorts in front. Near each cohort, he placed a troop of horſe to ſupport them, that they might charge with the greater ſecurity and boldneſs. Thus the whole army looked more like one phalanx, than troops drawn up in manipuli, with ſpaces between them, after the Roman manner. The general himſelf commanded in the centre, his ſon in the left wing, and Caſſius in the right.

11
The battle of Carrhæ.

In this order they advanced to the banks of a ſmall river called the *Baliſſus*, the ſight of which was very pleaſing to the ſoldiers, who were much harraſſed with drought and exceſſive heat. Moſt of the officers were for encamping on the banks of this river, or rather rivulet, to give the troops time to refreſh themſelves after the fatigues of ſo long and painful a march; and, in the mean time, to procure certain intelligence of the number and diſpoſition of the Parthian army; but Craſſus, ſuffering himſelf to be hurried on by the inconſiderate ardour of his ſon, and the horſe he commanded, only allowed the legions to take a meal ſtanding; and before this could be done by all, he ordered them to advance, not ſlowly, and halting now and then, after the Roman manner, but as faſt as they could move, till they came in ſight of the enemy, who, contrary to their expectation, did not appear either ſo numerous or ſo terrible as they had been repreſented; but this was a ſtratagem of Surenas, who had concealed his men in convenient places, ordering them to cover their arms, leſt their brightneſs ſhould betray them, and, ſtarting up at the firſt ſignal, to attack the enemy on all ſides. The ſtratagem had the deſired effect; for Surenas no ſooner gave the ſignal, than the Parthians, riſing as it were out of the ground, with dreadful cries, and a moſt frightful noiſe, advanced againſt the Romans, who were greatly ſurpriſed and diſmayed at that ſight; and much more ſo, when the Parthians, throwing off the covering of their arms, appeared in ſhining cuiraſſes, and helmets of burniſhed ſteel, finely mounted on horſes covered all over with armour of the ſame metal. At their head appeared young Surenas, in a rich dreſs, and was the firſt who charged the enemy, endeavouring, with his pikemen, to break through the firſt ranks of the Roman army; but finding it too cloſe and impenetrable, the cohorts ſupporting each other, he fell back, and retired in a ſeeming confuſion: but the Romans were much ſurpriſed when they ſaw themſelves ſuddenly ſurrounded on all ſides, and galled with continual ſhowers of arrows. Craſſus ordered his light-armed foot and archers to advance, and charge the enemy; but they were ſoon repulſed, and forced to cover themſelves behind the heavy-armed foot. Then the Parthian horſe, advancing near the Romans, diſcharged ſhowers of arrows upon them, every one of which did execution, the legionaries being drawn up in ſuch cloſe order, that it was impoſſible for the enemy to miſs their aim. As their arrows were of an extraordinary weight, and diſcharged with incredible force and impetuoſity, nothing was proof againſt them. The two wings advanced in good order to repulſe them, but to no effect; for the Parthians ſhot their arrows with as great dexterity when their backs were turned, as when they faced the enemy; ſo that the Romans, whether they kept their ground, or purſued the flying enemy, were equally annoyed with their fatal arrows.

The Romans, as long as they had any hopes that the Parthians, after having ſpent their arrows, would either betake themſelves to flight, or engage them hand to hand, ſtood their ground with great reſolution and intrepidity; but when they obſerved, that there were a great many camels in their rear, loaded with arrows, and that thoſe who emptied their quivers wheeled about to fill them anew, they began to loſe courage, and loudly to complain of their general for ſuffering them thus to ſtand ſtill, and ſerve only as a butt to the enemy's arrows, which, they well ſaw, would not be exhauſted till they were all killed to a man. Hereupon Craſſus ordered his ſon to advance, at all adventures, and attack the enemy with 1300 horſe, 500 archers, and 8 cohorts. But the Parthians no ſooner ſaw this choice body (for it was the flower of the army) marching up againſt them, but they wheeled about, and betook themſelves, according to their cuſtom, to flight. Hereupon young Craſſus, crying out as loud as he could, *They fly before us*, puſhed on full ſpeed after them, not doubting but he ſhould gain a complete victory; but, when he was at a great diſtance from the main body of the Roman army, he perceived his miſtake; for thoſe who before had fled, facing about, charged him with incredible fury. Young Craſſus ordered his troops to halt, hoping that the enemy, upon ſeeing their ſmall number, would not be afraid to come to a cloſe fight: but herein he was likewiſe greatly diſappointed; for the Parthians, contenting themſelves to oppoſe his front with their heavy-armed horſe, ſurrounded him on all ſides; and, keeping at a diſtance, diſcharged inceſſant ſhowers of arrows upon the unfortunate Romans, thus ſurrounded and pent up. The Parthian cavalry, in wheeling about, raiſed ſo thick a duſt, that the Romans could ſcarce ſee one another, much leſs the enemy: nevertheleſs, they found themſelves wounded with arrows, tho' they could not perceive whence they came. In a ſhort time, the place where they ſtood was all ſtrown with dead bodies.

12 Extreme diſtreſs of the Romans.

Some of the unhappy Romans finding their entrails torn, and many overcome by the exquiſite torments they ſuffered, rolled themſelves on the ſand with the arrows in their bodies, and expired in that manner. Others endeavouring to tear out by force the bearded points of the arrows, only made the wounds the larger and increaſed their pain. Moſt of them died in this manner; and thoſe who outlived their companions were no more in a condition to act; for when young Craſſus exhorted them to march up to the enemy, ſome ſhewed him their wounded bodies, others their hands nailed to their bucklers, and ſome their feet pierced through and pinned to the ground: ſo that it was equally impoſſible for them either to attack the enemy or defend themſelves. The young commander, therefore, leaving his infantry to the mercy of the enemy, advanced at the head of the cavalry againſt their heavy-armed horſe. The thouſand Gauls whom he had brought with him from the weſt, charged the enemy with incredible boldneſs and vigour; but their lances did little execution on men armed with cuiraſſes, and horſes covered with tried armour: however, they behaved with great reſolution; for ſome of them taking hold of the enemies ſpears, and cloſing with them, threw them off their horſes on the ground, where they lay without being able to ſtir, by reaſon of the great weight of their armour; others diſmounting, crept under the enemy's horſes, and thruſting their ſwords into their bellies, made them throw their riders. Thus the brave Gauls fought, tho' greatly harraſſed with heat and thirſt, which they were not accuſtomed to bear, till moſt of their horſes were killed, and their commander dangerouſly wounded. They then thought it adviſeable to retire to their infantry, which they no ſooner joined, than the Parthians inveſted them anew, making a moſt dreadful havock of them with their arrows. In this deſperate condition, Craſſus, ſpying a riſing ground at a ſmall diſtance, led the remains of his detachment thither, with a deſign to defend himſelf in the beſt manner he could, till ſuccours ſhould be ſent him from his father. The Parthians purſued him; and having ſurrounded him in his new poſt, continued ſhowering arrows upon his men, till moſt of them were either killed or diſabled, without being able to make uſe of their arms, or give the enemy proofs of their valour.

13 The death of young Craſſus.

Young Craſſus had two Greeks with him, who had ſettled in the city of Carrhæ. Theſe, touched with compaſſion, at ſeeing ſo brave a man reduced to ſuch ſtreights, preſſed him to retire with them to the neighbouring city of Iſchnes, which had declared for the Romans; but the young Roman rejected their propoſal with indignation, telling them, that he would rather die a thouſand times than abandon ſo many valiant men, who ſacrificed their lives for his ſake. Having returned this anſwer to his two Greek friends, he embraced and diſmiſſed them, giving them leave to retire and ſhift for themſelves in the beſt manner they could. As for himſelf, having now loſt all hopes of being relieved, and ſeeing moſt of his men and friends killed round him, he gave way to his grief; and, not being able to make uſe of his arm, which was ſhot thro' with a large barbed arrow, he preſented his ſide to one of his attendants, and ordered him to put an end to his unhappy life. His example was followed by Cenſorius, a ſenator, by Megabacchus, an experienced and brave officer, and by moſt of the nobility who ſerved under him. Five hundred common ſoldiers were taken priſoners, and the reſt cut in pieces.

The Parthians, having thus cut off or taken the whole detachment commanded by young Craſſus, marched without delay againſt his father, who, upon the firſt advice that the enemy fled before his ſon, and were cloſely purſued by him, had taken heart, the more becauſe thoſe who had remained to make head againſt him, ſeemed to abate much of their ardour, the greateſt part of them having marched with the reſt againſt his ſon. Wherefore, having encouraged his troops, he had retired to a ſmall hill in his rear, to wait there till his ſon returned from the purſuit. Young Craſſus had diſpatched frequent expreſſes to his father, to acquaint him with the danger he was in; but they had fallen into the enemy's hands, and been by them put to the ſword: only the laſt, who had eſcaped with great difficulty, arrived ſafe, and informed him that his ſon was loſt if he did not ſend him an immediate and powerful reinforcement. This news threw Craſſus into the utmoſt conſternation; a thouſand affecting thoughts roſe in his mind, and diſturbed his reaſon to ſuch a degree, that he ſcarce knew what he was doing. However, the deſire he had of ſaving his ſon, and ſo many brave Romans who were under his command, made him immediately decamp, and march to their aſſiſtance; but he was not gone far before he was met by the Parthians, who, with loud ſhouts, and ſongs of victory, gave, at a diſtance, the unhappy father notice of his misfortune. They had cut off young Craſſus's head, and, having fixed it on the point of a lance, were advancing full ſpeed to fall on the father. As they drew near, Craſſus was ſtruck with that diſmal and affecting ſight; but, on this occaſion, behaved like an hero: for tho' he was under the deepeſt concern, he had the preſence of mind to ſtifle his grief, for fear of diſcouraging the army, and to cry out to the diſmayed troops, "This misfortune is entirely mine; the loſs of one man cannot affect the victory. Let us charge, let us fight like Romans: if you have any compaſſion for a father who has juſt now loſt a ſon whoſe valour you admired, let it appear in your rage and reſentment againſt theſe inſulting barbarians." Thus Craſſus ſtrove to reanimate his troops; but his efforts were unſucceſsful: their courage was quite ſunk, as appeared from the faint and languiſhing ſhout which they raiſed, according to cuſtom, before the action. When the ſignal was given, the Parthians, keeping to their old way of fighting, diſcharged clouds of arrows on the legionaries, without drawing near them; which did ſuch dreadful execution, that many of the Romans, to avoid the arrows, which occaſioned a long and painful death, threw themſelves, like men in deſpair, on the enemy's heavy-armed horſe, ſeeking from their ſpears a more quick and eaſy kind of death. Thus the Parthians continued plying them inceſſantly with their arrows till night, when they left the field of battle, crying out, that they would allow the father one night to lament the death of his ſon.

14 Diſtreſs of Craſſus.

This was a melancholy night for the Romans. Craſſus kept himſelf concealed from the ſoldiery, lying not in the general's tent, but in the open air, and on the bare ground, with his head wrapped up in his paludamentum or military cloak: and was, in that forlorn condition, ſays Plutarch, a great example to the vulgar, of the inſtability of fortune; to the wiſe, a ſtill greater of the pernicious effects of avarice, temerity, and ambition. Octavius, one of his lieutenants, and Caſſius, approached him, and endeavoured to raiſe him up and conſole him: but, ſeeing him quite ſunk under the weight of his affliction, and deaf to all comfort, they ſummoned a council of war, compoſed of all the chief officers; wherein it was unanimouſly reſolved, that they ſhould decamp before break of day, and retire, without ſound of trumpet, to the neighbouring city of Carrhæ, which was held by a Roman garriſon. Agreeable to this reſolution, they began their march as ſoon as the council broke up; which produced dreadful outcries among the ſick and wounded, who, perceiving that they were to be abandoned to the mercy of the enemy, filled the camp with their complaints and lamentations: but their cries and tears, though very affecting, did not ſtop the march of the others, which, indeed, was very ſlow, to give the ſtragglers time to come up. There were only 300 light horſe, under the command of one Ægnatius, who purſued their march, without ſtopping. Theſe arriving at Carrhæ about midnight, Ægnatius, calling to the centinels on the walls, deſired them to acquaint Coponius, governor of the place, that Craſſus had fought a great battle with the Parthians; and, without ſaying a word more, or letting them know who he was, continued his march with all poſſible expedition to the bridge of Zeugma; which he paſſed, and by that means ſaved his troops, but was much blamed for abandoning his general.

However, the meſſage he ſent to Coponius was of ſome temporary ſervice to Craſſus. For that commander, wiſely conjecturing, from the manner in which the unknown perſon had given him that intelligence, that ſome miſfortune had befallen Craſſus, immediately ordered his garriſon to ſtand to their arms; and, marching out, met Craſſus, and conducted him and his army into the city: for the Parthians, tho' informed of his flight, did not offer to purſue him, obſerving therein the ſuperſtitious cuſtom which obtained among them and the Perſians, not to fight in the night; but, when it was day, they entered the Roman camp, and, having put all the wounded, to the number of 4000, to the ſword, diſperſed their cavalry all over the plain, in purſuit of the fugitives. One of Craſſus's lieutenants, named *Vargunteius*, having ſeparated in the night from the main body of the army, with four cohorts, miſſed his way, and was overtaken by the enemy; at whoſe approach he withdrew to a neighbouring hill, where he defended himſelf with great valour, till all his men were killed, except 20, who made their way through the enemy ſword in hand, and got ſafe to Carrhæ: but Vargunteius himſelf loſt his life on this occaſion.

15 Surenas pretends to confer with Craſſus.

In the mean time Surenas, not knowing whether Craſſus and Caſſius had retired to Carrhæ, or choſen a different route; in order to be informed of the truth, and take his meaſures accordingly, diſpatched a meſſenger, who ſpoke the Roman language, to the city of Carrhæ, enjoining him to approach the walls, and acquaint Craſſus himſelf, or Caſſius, that the Parthian general was inclined to enter into a treaty with them, and demanded a conference. Both the proconſul and his quæſtor Caſſius ſpoke from the walls with the meſſenger; and, accepting the propoſal with great joy, deſired that the time and place for an interview might be immediately agreed upon. The meſſenger withdrew, promiſing to return quickly with an anſwer from Surenas: but that general no ſooner underſtood that Craſſus and Caſſius were in Carrhæ, than he marched thither with his whole army; and, having inveſted the place, acquainted the Romans, that, if they expected any favourable terms, they muſt deliver up Craſſus and Caſſius to him in chains. Hereupon a council of the chief officers being ſummoned, it was thought expedient to retire from Carrhæ that very night, and ſeek for another aſylum. It was of the utmoſt importance, that none of the inhabitants of Carrhæ ſhould be acquainted with their deſign till the time of its execution; but Craſſus, whoſe whole conduct evidently ſhews that he was blinded, as Dio Caſſius obſerves, by ſome divinity, imparted the whole matter in confidence to one Andromachus, chooſing him for his guide, and relying injudiciouſly on the fidelity of a man whom he ſcarce knew. Andromachus immediately acquainted Surenas with the deſign of the Romans; promiſing at the ſame time, as the Parthians did not engage in the night, to manage matters ſo, that they ſhould not get out of his reach before day-break. Purſuant to his promiſe, he led them through many windings and turnings, till he brought them into deep marſhy grounds, where the infantry were up to the knees in mire. Then Caſſius, ſuſpecting that their guide had led them into thoſe bogs with no good deſign, refuſed to follow him any longer; and, returning to Carrhæ, took his route towards Syria, which he reached with 500 horſe. Octavius, with 5000 men under his command, being conducted by truſty guides, gained the mountains called by Plutarch and Appian *Sinnaci*, and there intrenched himſelf before break of day.

As for Craſſus, he was ſtill entangled in the marſhes, when Surenas, at the riſing of the ſun, overtook him, and inveſted him with his cavalry. The proconſul had with him four cohorts, and a ſmall body of horſe; and with theſe he gained, in ſpite of all oppoſition, the ſummit of another hill within 12 furlongs of Octavius; who, ſeeing the danger that threatened his general, flew to his aſſiſtance, firſt with a ſmall number of his men, but was ſoon followed by all the reſt, who, being aſhamed of their cowardice, quitted their poſt, tho' very ſafe, and, charging the Parthians with great fury, diſengaged Craſſus, and obliged the enemy to abandon the hill. Upon the retreat of the enemy, they formed themſelves into an hollow ſquare; and placing Craſſus in the middle, made a kind of rampart round him with their bucklers, reſolutely proteſting, that none of the enemy's arrows ſhould touch their general's body, till they were all killed fighting in his defence. Surenas, loth to let ſo fine a prey eſcape, ſurrounded the hill, as if he deſigned to make a new attack: but, finding his Parthians very backward, and not doubting but the Romans, when night came on, would purſue their march, and get out of his reach, he had recourſe again to artifice; and declared before ſome priſoners, whom he ſoon after ſet at liberty, that he was inclined to treat with the proconſul of a peace; and that it was better to come to a reconciliation with Rome, than to ſow the ſeeds of an eternal war, by ſhedding the blood of one of her generals.

Agreeable to this declaration, Surenas, as ſoon as the priſoners were releaſed, advanced towards the hill where the Romans were poſted, attended only by ſome of his officers, and, with his bow unbent, and open arms, invited Craſſus to an interview. So ſudden a change ſeemed very ſuſpicious to the proconſul; who therefore declined the interview, till he was forced, by his own ſoldiers, to intruſt his life with an enemy whoſe treachery they had all experienced; for the legionaries flocking round him, not only abuſed him in an outrageous manner, but even menaced him if he did not accept of the propoſals made him by the Parthian general. Seeing, therefore, that his troops were ready to mutiny, he began to advance, without arms or guards, towards the enemy, after having called the gods and his officers to witneſs the violence his troops offered him; and intreated all who were preſent, but eſpecially Octavius and Petronius, two of the chief commanders, for the honour of Rome their common mother, not to mention, after his death, the ſhameful behaviour of the Roman legionaries. Octavius and Petronius could not reſolve to let him go alone; but attended him down the hill, as did likewiſe ſome legionaries, keeping at a diſtance. Craſſus was met at the foot of the hill by two Greeks; who, diſmounting from their horſes, ſaluted him with great reſpect; and deſired him, in the Greek tongue, to ſend ſome of his attendants, who might ſatisfy him, that Surenas, and thoſe who were with him, came without arms. Hereupon Craſſus ſent two brothers, of the Roſcian family; but Surenas, having cauſed them to be ſeized, advanced to the foot of the hill, mounted on a fine horſe, and attended by the chief officers of his army. Craſſus, who waited for the return of his two meſſengers, was ſurpriſed to ſee himſelf prevented by Surenas in perſon, when he leaſt expected it. The Parthian general, perceiving, as he approached Craſſus, that he was on foot, cried out, in a ſeeming ſurprize, "What do I ſee? a Roman general on foot, and we on horſeback! Let an horſe be brought for him immediately." "You need not be ſurpriſed, (replied Craſſus;) we are come only to an interview, each after the cuſtom of his country." "Very well, (anſwered Surenas:) there ſhall be henceforth a laſting peace between king Orodes and the people of Rome: but we muſt ſign the articles of it on the banks of the Euphrates; for you Romans do not always remember your conventions." Craſſus would have ſent fort an horſe: but a very ſtately one, with a golden bit, and richly capariſoned, was brought to him by a Parthian; which Surenas preſenting to him, "Accept this horſe from my hands, (ſaid he), which I give you in the name of my maſter king Orodes." He had ſcarce uttered theſe words, when ſome of the king's officers, taking Craſſus by the middle, ſet him upon the horſe, which they began to whip with great violence before them in order to make him quicken his pace. Octavius, offended at this inſult, took the horſe by the bridle; Petronius, and the few Romans who were preſent, ſeconded him, and flocking all round Craſſus, ſtopped his horſe. The Parthians endeavoured to repulſe them, and clear the way for the proconſul; whereupon they began to juſtle and puſh one another with great tumult and diſorder. At laſt, Octavius, drawing his ſword, killed one of the king's grooms; but, at the ſame time, another coming behind Octavius, with one blow laid him dead at his feet. Both parties fought with great reſolution, the Parthians ſtriving to carry off Craſſus, and the Romans to reſcue him out of their hands. In this ſcuffle moſt of the Romans who came to the conference were killed; and, among the reſt, Craſſus himſelf, but whether by a Roman or a Parthian is uncertain.

Craſſus killed.

Upon his death, the reſt of the army either ſurrendered to the enemy, or, diſperſing in the night, were purſued, and put to the ſword. The Romans loſt in this campaign at leaſt 30,000 men; of which 20,000 were killed, and 10,000 taken priſoners.

When the battle of Carrhæ was fought, king Orodes was in Armenia, where he had made peace with Artabazus. While the two kings were ſolemnizing their new alliance with expenſive and public feaſts, Styllaces, or Syllaces, a Parthian officer, whom Surenas had ſent with the news of his late victory, and the head of Craſſus as a proof of it, arrived in the capital of Armenia. The tranſports of joy which Orodes felt at this ſight, and theſe news, are not to be expreſſed; and the lords of both kingdoms, who attended their ſovereigns, raiſed loud and repeated ſhouts of joy. Syllaces was ordered to give a more particular and diſtinct account of that memorable action: which when he had done, Orodes commanded melted gold to be poured into Craſſus's mouth; reproaching him thereby with avarice, which had been always his predominant paſſion.

18
Surenas put to death by Orodes.

Surenas did not long enjoy the pleaſure of his victory; for Orodes, jealous of his power and authority among the Parthians, ſoon after cauſed him to be put to death. Pacorus, the king's favourite ſon, was put at the head of the army; and, agreeable to his father's directions, invaded Syria: but he was driven out from thence with great loſs by Cicero and Caſſius, the only general who ſurvived the defeat of Craſſus. After this we find no mention of the Parthians, till the time of the civil war between Cæſar and Pompey, when the latter ſent ambaſſadors to ſolicit ſuccour againſt his rival. This Orodes was willing to grant, upon condition that Syria was delivered up to him: but as Pompey would not conſent to ſuch a propoſal, the ſuccours were not only denied, but, after the battle of Pharſalia, he put Lucius Hirtius in irons, whom Pompey had again ſent to aſk aſſiſtance, or at leaſt to deſire leave to ſhelter himſelf in the Parthian dominions.

19
War commenced againſt the Parthians by Mark Anthony.

Cæſar is ſaid to have meditated a war againſt the Parthians, which in all probability would have proved fatal to them. His death delivered them from this danger. But, not long after, the eaſtern provinces, being grievouſly oppreſſed by Mark Anthony, roſe up in arms; and having killed the taxgatherers, invited the Parthians to join them, and drive out the Romans. They very readily accepted the invitation, and croſſed the Euphrates with a powerful army under the command of Pacorus and Labienus a Roman general of Pompey's party. At firſt they met with great ſucceſs, over-ran all Aſia Minor, and reduced all the countries as far as the Helleſpont and the Egæan Sea, ſubduing likewiſe Phœnicia, Syria, and even Judæa. They did not however long enjoy their new conqueſts: for being elated with their victories, and deſpiſing the enemy, they engaged Ventidius, Anthony's lieutenant, before Labienus had time to join them, and were utterly defeated. This ſo diſheartened Labienus's army, that they all abandoned him; and he himſelf, being thus obliged to wander from place to place in diſguiſe, was at laſt taken and put to death at Cyprus. Ventidius purſuing his advantage, gained ſeveral other victories; and at laſt entirely defeated the Parthian army under Pacorus, cutting almoſt the whole of them in pieces, and the prince himſelf among the reſt. He did not, however, purſue this laſt victory as he might have done; being afraid of giving umbrage to Anthony, who had already become jealous of the great honour gained by his lieutenant. He therefore contented himſelf with reducing thoſe places in Syria and Phœnicia which the Parthians had taken in the beginning of the war, until Anthony arrived to take the command of the army upon himſelf.

20
Pacorus defeated and killed by Ventidius.

21
Orodes murdered.

Orodes was almoſt diſtracted with grief on receiving the dreadful news of the loſs of his army and the death of his favourite ſon. However, when time had reſtored the uſe of his faculties, he appointed Phrahates, the eldeſt, but the moſt wicked, of all his children, to ſucceed him in the kingdom, admitting him at the ſame time to a ſhare of the ſovereign authority with himſelf. The conſequence of this was, that Phrahates very ſoon attempted to poiſon his father with hemlock. But this, contrary to expectation, proving a cure for the dropſy which an exceſs of grief had brought upon the king, the unnatural ſon had him ſtifled in bed; and ſoon after not only murdered all his own brethren, who were 30 in number, but cut off all the reſt of the royal family, not ſparing even his own eldeſt ſon, leſt the diſcontented Parthians ſhould place him, as he was already of age, on the throne.

Many of the chief lords of Parthia, being intimidated by the cruelty of Phrahates, retired into foreign countries; and among theſe was one Monœſes, a perſon of great diſtinction, as well as ſkill and experience in war. This man, having fled to Anthony, ſoon gained his confidence, and was by him eaſily prevailed upon to engage in a war againſt his countrymen. But Phrahates, juſtly dreading the conſequences of ſuch a perſon's defection, ſent a ſolemn embaſſy to invite him home on ſuch terms as he ſhould think fit to accept: which greatly provoked Anthony; though he did not hinder him from returning, leſt others ſhould thereby be diſcouraged from coming over to him. He therefore diſmiſſed him with great civility, ſending ambaſſadors at the ſame time to Phrahates to treat of a peace. Thus he hoped to divert the Parthian monarch's attention from making the neceſſary preparations for war, and that he ſhould be able to fall upon him in the ſpring when he was in no condition to make reſiſtance. But herein he was greatly diſappointed; for, on his arrival at the Euphrates, which he intended to paſs, and enter the Parthian dominions on that ſide, he found all the paſſes ſo well guarded, that he thought proper to enter Media, with a deſign firſt to reduce that country, and then to enter Parthia.

22
Anthony betrayed by Artabazus king of Armenia.

This plan had been ſuggeſted to him by Artabazus king of Armenia, who in the end betrayed him; for, inſtead of conducting the army the ſtraight way from Zeugma on the Euphrates, to the Araxes which parted Media from Armenia, and which was about 500 miles diſtant from the place whence he firſt ſet out, Artabazus led them over rocks and mountains ſo far about, that the army had marched above 1000 miles before they reached the borders of Media, where they intended to begin the war. Thus they were not only greatly fatigued, but had not ſufficient time, the year being far ſpent, to put in execution the deſign on which they had come. However, as Anthony was impatient to get back to Cleopatra, he left behind him moſt of the baggage of the army, and 300 waggons loaded with battering rams and other military engines for ſieges; appointing Statianus, one of his lieutenants, with a body of 10,000 men, to guard them, and to bring them, by ſlower marches, after the army. With the reſt of the forces he marched more than 300 miles before the reſt, without allowing his men any reſpite till he arrived at Praaſpa, or Phrahata, the capital of Media, which he immediately inveſted. But the Parthians, well knowing that he could not make any progreſs without his military machines, paſſed by his army, in order to attack Statianus; which they did with ſuch ſucceſs, that the body commanded by him were all to a man cut off, and all their military engines taken, among which was a battering ram 80 feet long.

23 Ten thouſand Romans cut off.

Anthony, notwithſtanding this diſaſter, continued the ſiege of Praaſpa; but was daily haraſſed by ſallies of the garriſon from within, and the enemy's army without. At laſt he began to think of a retreat when his proviſions were almoſt exhauſted, finding it impoſſible to become maſter of the city. But as he was to march 300 miles through the enemy's country, he thought proper firſt to ſend ambaſſadors to the Parthian monarch, acquainting him that the Roman people were willing to allow him a peace, provided he would reſtore the ſtandards and priſoners taken at Carrhæ. Phrahates received the ambaſſadors, ſitting on a golden throne; and, after having bitterly inveighed againſt the avarice and unbounded ambition of the Romans, told them that he would not part with the ſtandards and priſoners; but that, if Antony would immediately raiſe the ſiege of Praaſpa, he would ſuffer him to retire unmoleſted.

24 Anthony leaves Parthia in great diſtreſs.

Anthony, who was reduced to great ſtraits, no ſooner received this anſwer, than he broke up the ſiege, and marched towards Armenia. However, Phrahates was not ſo good as his word; for the Romans were attacked by the enemy no fewer than 18 times on their march, and were thrice in the utmoſt danger of being cut off. A famine alſo raged in the Roman army; upon which they began to deſert to the enemy; and indeed Anthony would probably have been left by himſelf, had not the Parthians, in a very cruel as well as impolitic manner, murdered all thoſe who fled to them in ſight of the reſt. At laſt, after having loſt 32,000 men, and being reduced to ſuch deſpair that he was with difficulty prevented from laying violent hands on himſelf, he reached the river Araxes; when his men, finding themſelves out of the reach of the enemy, fell down on the ground, and kiſſed it with tears of joy.

Antony was no ſooner gone, than the kings of Media and Parthia quarrelled about the booty they had taken; and after various conteſts, Phrahates reduced all Media and Armenia. After this, being elated with his conqueſts, he oppreſſed his ſubjects in ſuch a cruel and tyrannical manner, that a civil war took place; in which the competitors were alternately driven out and reſtored, till the year 50, when one Vologeſes, the ſon of Gotarzes, a former king, became peaceable poſſeſſor of the throne. He carried on ſome wars againſt the Romans, but with very indifferent ſucceſs, and at laſt gladly conſented to a renewal of the ancient treaties with that powerful people.

25 Parthia ſubdued by Trajan.

From this time the Parthian hiſtory affords nothing remarkable till the reign of the emperor Trajan; when the Parthian king, by name *Coſdroes*, infringed the treaty with Rome, by driving out the king of Armenia. Upon this Trajan, who was glad of any pretence to quarrel with the Parthians, immediately haſtened into Armenia. His arrival there was ſo ſudden and unexpected, that he reduced almoſt the whole country without oppoſition; and took priſoner Parthamaſiris, the king whom the Parthians had ſet up. After this he entered Meſopotamia, took the city of Niſibis, and reduced to a Roman province the whole of that wealthy country.

Early in the ſpring of the following year, Trajan, who had kept his winter-quarters in Syria, took the field again; but was warmly oppoſed by Coſdroes. He found him encamped on the banks of the Euphrates, with a deſign to diſpute his paſſage: which he did with ſuch vigour, that the emperor, after having ſeveral times attempted to ford that river, and been always repulſed with great ſlaughter, was obliged to cauſe boats to be built on the neighbouring mountains, which he privately conveyed from thence on carriages to the water-ſide; and having in the night-time formed a bridge with them, he paſſed his army the next day; but not without great loſs and danger, the Parthians harraſſing his men the whole time with inceſſant ſhowers of arrows, which did great execution. Having gained the oppoſite bank, he advanced boldly into Aſſyria, the Parthians flying every where before him, and made himſelf maſter of Arbela. Thence he purſued his march; ſubduing, with incredible rapidity, countries where the Roman ſtandard had never been diſplayed before. Babylonia, or the province of Babylon, voluntarily ſubmitted to him. The city itſelf was, after a vigorous reſiſtance, taken by ſtorm; by which means he became maſter of all Chaldea and Aſſyria, the two richeſt provinces of the Parthian empire. From Babylon he marched to Cteſiphon, the metropolis of the Parthian monarchy; which he beſieged, and at laſt reduced. But as to the particulars of theſe great conqueſts, we are quite in the dark; this expedition, however glorious to the Roman name, being rather hinted at, than deſcribed, by the writers of thoſe times. While Trajan was thus making war in the heart of the enemy's country, Coſdroes, having recruited his army, marched into Meſopotamia, with a deſign to recover that country, and cut off all communication between the Roman army and Syria. On his arrival in that province, the inhabitants flocked to him from all parts; and moſt of the cities, driving out the garriſons left by Trajan, opened their gates to him. Hereupon the emperor detached Lucius and Maximus, two of his chief commanders, into Meſopotamia, to keep ſuch cities in awe as had not revolted, and to open a communication with Syria. Maximus was met by Coſdroes; and having ventured a battle, his army was entirely defeated, and himſelf killed. But Lucius being joined by Enricius and Clarius, two other commanders ſent by Trajan with freſh ſupplies, gained conſiderable advantages over the enemy, and retook the cities of Niſibis and Seleucia, which had revolted.

And now Trajan, ſeeing himſelf poſſeſſed of all the beſt and moſt fruitful provinces of the Parthian empire; but at the ſame time being well appriſed that he could not, without a vaſt expence, maintain his conqueſts, nor keep in ſubjection ſo fierce and warlike a people at ſuch a diſtance from Italy; reſolved to ſet over them a king of his own chooſing, who ſhould hold the crown of him and his ſucceſſors, and acknowledge them as his lords and ſovereigns. With this view he repaired to Cteſiphon; and having there aſſembled the chief men of the nation, he crowned one of the royal family, by name *Parthanaſpates*, king of Parthia, obliging all who were preſent to pay him their allegiance. He choſe Parthanaſpates, becauſe that prince had joined him at his firſt entering the Parthian dominions, conducted him with great fidelity, and ſhown on all occaſions an extraordinary attachment to the Romans. Thus the Parthians were at laſt ſubdued, and their kingdom made tributary to Rome. But they did not long continue in this ſtate of ſubjection: for they no ſooner heard of Trajan's death, which happened ſhortly after, than, taking up arms, they drove Parthanaſpates from the throne; and, recalling Coſdroes, who had retired into the country of the Hyrcanians, openly revolted from Rome. Adrian, who was then commander in chief of all the forces in the eaſt, and ſoon after acknowledged emperor by the army, did not care, though he was at that time in Syria with a very numerous army, to engage in a new war with the Parthians; but contented himſelf with preſerving the ancient limits of the empire, without any ambitious proſpects of further conqueſts. Therefore, in the beginning of his reign, he abandoned thoſe provinces beyond the Euphrates which Trajan had conquered; withdrew the Roman garriſons from Meſopotamia; and, for the greater ſafety of other places, made the Euphrates the boundary of and barrier in thoſe parts, poſting his legions along the banks of that river.

26 Parthanaſpates appointed king by the Roman emperor, but ſoon after driven out.

27 Unſucceſsful wars of Vologeſes with the Romans.

Coſdroes died after a long reign, and was ſucceeded by his eldeſt ſon Vologeſes: in whoſe reign the Alani breaking into Media, then ſubject to the Parthians, committed there great devaſtations; but were prevailed upon, with rich preſents ſent them by Vologeſes, to abandon that kingdom, and return home. Upon their retreat, Vologeſes, having no enemy to contend with at home, fell unexpectedly upon Armenia; ſurpriſed the legions there; and having cut them all in pieces to a man, entered Syria; defeated with great ſlaughter Attilius Cornelianus, governor of that province; and advanced, without oppoſition, to the neighbourhood of Antioch; putting every where the Romans, and thoſe who favoured them, to the ſword. Hereupon the emperor Verus, by the advice of his colleague Antoninus ſurnamed the *Philoſopher*, leaving Rome, haſtened into Syria: and having driven the Parthians out of that province, ordered Statius Priſcus to invade Armenia; and Caſſius, with Martius Verus, to enter the Parthian territories, and carry the war into the enemy's country. Priſcus made himſelf maſter of Artaxata; and in one campaign drove the Parthians, though not without great loſs on his ſide, quite out of Armenia. Caſſius, on the other hand, having, in ſeveral encounters, defeated Vologeſes, tho' he had an army of 400,000 men under his command, reduced, in four years time, all thoſe provinces which had formerly ſubmitted to Trajan, took Seleucia, burnt and plundered the famous cities of Babylon and Cteſiphon, with the ſtately palaces of the Parthian monarchs, and ſtruck terror into the moſt remote provinces of that great empire. On his return, he loſt above half the number of his forces by ſickneſs and famine; ſo that, after all, the Romans, as Spartianus obſerves, had no great reaſon to boaſt of their victories and conqueſts.

However, Verus, who had never ſtirred during the whole time of the war from Antioch and Daphne, took upon him the lofty titles of *Parthicus* and *Armenicus*, as if he had acquired them juſtly in the midſt of his pleaſures and debaucheries. After the revolt and death of Caſſius, Antoninus the Philoſopher repaired into Syria to ſettle the affairs of that province. On his arrival there, he was met by ambaſſadors from Vologeſes; who having recovered moſt of the provinced ſubdued by Caſſius, and being unwilling either to part with them or engage in a new war, ſolicited the emperor to confirm him in the poſſeſſion of them, promiſing to hold them of him, and to acknowledge the ſovereignty of Rome. To theſe terms Antoninus readily agreed, and a peace was accordingly concluded between the two empires; which Vologeſes did not long enjoy, being ſoon after carried off by a diſtemper, and not murdered by his own ſubjects, as we read in Conſtantinus Manaſſes, who calls him *Belegeſes*.

28 Cteſiphon taken by Severus.

Upon his death, Vologeſes III. the ſon of his brother Sanatruces, and grandſon of Coſdroes, was raiſed to the throne. He ſided with Niger againſt the emperor Severus: who thereupon, having ſettled matters at home, marched with all his forces againſt him; and advancing to the city of Cteſiphon, whither he had retired, laid cloſe ſiege to that metropolis. Vologeſes made a moſt gallant defence; but the city, after a long ſiege, and much bloodſhed on both ſides, was at length taken by aſſault. The king's treaſures, with his wives and children, fell into the emperor's hands; but Vologeſes himſelf had the good luck to make his eſcape; which was a great diſappointment to Severus, who immediately diſpatched an expreſs to acquaint the ſenate with the ſucceſs that had attended him in his expedition againſt the only nation that was then formidable to Rome. But he had no ſooner croſſed the Euphrates, than Vologeſes recovered all the provinces, except Meſopotamia, which he had reduced. Theſe expeditions were chargeable to the Romans, and coſt them much blood, without reaping any advantages from them; for as they had not ſufficient forces to keep in awe the provinces they had ſubdued, the inhabitants, greatly attached to the family of Arſaces, never failed to return to their ancient obedience as ſoon as the Roman armies were withdrawn. Vologeſes was ſoon after engaged in a war ſtill more troubleſome and deſtructive, with his brother Artabanus, who, encouraged by ſome of the diſcontented nobles, attempted to rob him of the crown, and place it on his own head. Vologeſes gained ſeveral victories over his brother and rebellious ſubjects; but died before he could reſtore the empire to its former tranquillity.

Artabanus, who had a numerous army at his devotion, did not meet with any oppoſition in ſeizing the throne, vacant by the death of his brother, though

Tiridates had a better title to it, as being his elder brother. He had ſcarce ſettled the affairs of his kingdom, when the emperor Caracalla, deſirous to ſignalize himſelf, as ſeveral of his predeceſſors had done, by ſome memorable exploit againſt the Parthians, ſent a ſolemn embaſſy to him, deſiring his daughter in marriage. Artabanus, overjoyed at this propoſal, which he thought would be attended with a laſting peace between the two empires, received the ambaſſadors with all poſſible marks of honour, and readily complied with their requeſt. Soon after, Caracalla ſent a ſecond embaſſy, to acquaint the king that he was coming to ſolemniſe the nuptials; whereupon Artabanus went to meet him, attended with the chief of the nobility and his beſt troops, all unarmed, and in moſt pompous habits: but this peaceable train no ſooner approached the Roman army, than the ſoldiers, on a ſignal given them, falling upon the king's retinue, made a moſt terrible ſlaughter of the unarmed multitude; Artabanus himſelf eſcaping with great difficulty. The treacherous Caracalla, having gained by this exploit great booty, and, as he thought, no leſs glory, wrote a long and boaſting letter to the ſenate, aſſuming the title of *Parthicus* for this piece of treachery; as he had before that of *Germanicus*, for murdering, in like manner, ſome of the German nobility.

29
Infamous treachery of the emperor Caracalla.

Artabanus, reſolving to make the Romans pay dear for their inhuman and barbarous treachery, raiſed the moſt numerous army that had ever been known in Parthia, croſſed the Euphrates, and entered Syria, putting all to fire and ſword. But, Caracalla being murdered before this invaſion, Macrinus, who had ſucceeded him, met the Parthians at the head of a mighty army, compoſed of many legions, and all the auxiliaries of the ſtates of Aſia. The two armies no ſooner came in ſight of each other, but they engaged with the utmoſt fury. The battle continued two days; both Romans and Parthians fighting ſo obſtinately, that night only parted them, without any apparent advantage on either ſide; though both retired, when night had put an end to the conteſt, crying, Victory, victory. The field of battle was covered all over with dead bodies, there being already above 40,000 killed, including both Romans and Parthians: nevertheleſs Artabanus was heard to ſay, that the battle was only begun, and that he would continue it till either the Parthians or Romans were all to a man cut in pieces. But Macrinus, being well appriſed that the king came highly enraged againſt Caracalla in particular, and dreading the conſequences which would attend the deſtruction of his army, ſent an herald to Artabanus, acquainting him with the death of Caracalla, and propoſing an alliance between the two empires. The king, underſtanding that his great enemy was dead, readily embraced the propoſals of peace and amity, upon condition that all the priſoners who had been taken by the treachery of Caracalla ſhould be immediately reſtored, and a large ſum of money paid him to defray the expences of the war.

30
A deſperate battle between the Parthians and Romans.

Theſe articles being performed without delay or heſitation, Artabanus returned into Parthia, and Macrinus to Antioch.

As Artabanus loſt on this occaſion the flower of his army, Artaxerxes, a Perſian of mean deſcent, but of great courage and experience in war, revolting from the Parthians, prevailed on his countrymen to join him, and attempt the recovery of the ſovereign power, which he ſaid they had been unjuſtly deprived of, firſt by the Macedonians, and afterwards by the Parthians their vaſſals. Artabanus, upon the news of this revolt, marched with the whole ſtrength of his kingdom to ſuppreſs it; but being met by Artaxerxes, at the head of a no leſs powerful army, a bloody battle enſued, which is ſaid to have laſted three days. At length the Parthians, though they behaved with the utmoſt bravery, and fought like men in deſpair, were forced to yield to the Perſians, who were commanded by a more experienced leader. Moſt of their troops were cut off in the flight; and the king himſelf was taken priſoner, and ſoon after put to death by Artaxerxes's order. The Parthians, having loſt in this fatal engagement both their king and their army, were forced to ſubmit to the conqueror, and become vaſſals to a nation which had been ſubject to them for the ſpace of 475 years.

31
The Perſians revolt, and overthrew the Parthian empire.

For an account of the manners, cuſtoms, &c. of the ancient Parthians, ſee the article Persia.

PARTI, **Partie**, *Party*, or *Parted*, in heraldry, is applied to a ſhield or eſcutcheon, denoting it divided or marked out into partitions.

Parti per pale, is when the ſhield is divided perpendicularly into two halves, by a cut in the middle from top to bottom.

Parti per feſs, is when the cut is acroſs the middle, from ſide to ſide.

Parti per bend dexter, is when the cut comes from the upper corner of the ſhield on the right hand, and deſcends athwart to the oppoſite lower corner.

Parti per bend ſiniſter, is when the cut, coming from the upper left corner, deſcends acroſs to the oppoſite lower one.

All theſe partitions, according to M. de la Colombiere, have their origin from the cuts and bruiſes that have appeared on ſhields after engagements; and, being proofs of the dangers to which the bearers had been expoſed, they gained them eſteem: for which reaſon they were tranſmitted to poſterity, and became arms and marks of honour to their future families.

PARTICIPLE, in grammar, an adjective formed of a verb; ſo called, becauſe it participates partly of the properties of a noun, and partly of thoſe of a verb. See Grammar.

PARTICLE, in phyſiology, the minute part of a body, an aſſemblage of which conſtitutes all natural bodies.

Particle, in grammar, a denomination for all thoſe ſmall words that tie or untie others, or that expreſs the modes or manners of words. See Grammer.

PARTISAN, in the art of war, a perſon dextrous in commanding a party; who, knowing the country well, is employed in getting intelligence, or ſurpriſing the enemy's convoy, &c. The word alſo means an officer ſent out upon a party, with the command of a body of light troops, generally under the apellation of the partiſans corps. It is alſo neceſſary that this corps ſhould be compoſed of infantry, light-horſe, and huſſars.

PARTNERSHIP, is a contract among two or more perſons, to carry on a certain buſineſs, at their joint expence, and ſhare the gain or loſs which ariſes from it. Of this there are four kinds.

I. Occaſional joint trade, where two or more merchants agree to employ a certain ſum in trade, and divide the gain or loſs ſo ſoon as the adventure is brought to an iſſue. This kind of contract being generally private, the parties concerned are not liable for each other. If one of them purchaſe goods on truſt, the furniſher, who grants the credit through confidence in him alone, has no recourſe, in caſe of his inſolvency, againſt the other partners. They are only anſwerable for the ſhare of the adventure that belongs to the inſolvent partner.

If it be propoſed to carry the adventure further than originally agreed on, any partner may withdraw his intereſt; and, if it cannot be ſeparated from the others, may inſiſt that the whole ſhall be brought to an iſſue.

II. Standing companies, which are generally eſtabliſhed by written contract between the parties, where the ſtock, the firm, duration, the diviſion of the gain or loſs, and other circumſtances, are inſerted.

All the partners are generally authoriſed to ſign by the firm of the company, though this privilege may be confined to ſome of them by particular agreement. The firm ought only to be ſubſcribed at the place where the copartnery is eſtabliſhed. If a partner has occaſion, when abſent, to write a letter relating to their affairs, he ſubſcribes his own name on account of the company. When the ſame partners carry on buſineſs at different places, they generally chooſe different firms for each. The ſignature of each partner is generally ſent to new correſpondents; and, when a partner is admitted, although there be no alteration in the firm, his ſignature is tranſmitted, with an intimation of the change in the copartnery, to all their correſpondents. Houſes that have been long eſtabliſhed, often retain the old firm, though all the original partners be dead or withdrawn.

The powers of each partner are, in general, diſcretionary; but they ought not to act, in matters of importance, without conſulting together, when there is an opportunity. No partner is liable to make good the loſs ariſing from his judging wrong in a caſe where he had authority to act. If he exceeds his power, and the event prove unſucceſsful, he muſt bear the loſs; but, if it prove ſucceſsful, the gain belongs to the company: yet, if he acquaints the company immediately of what he has done, they muſt either acquieſce therein, or leave him the chance of gain, as well as the riſk of loſs.

All debts contracted under the firm of the company are binding on the whole partners, though the money was borrowed by one of them for his private uſe, without the conſent of the reſt. And, if a partner exceeds his power, the others are nevertheleſs obliged to implement his engagements; tho' they may render him reſponſible for his miſbehaviour.

Although the ſums to be advanced by the partners be limited by the contract, if there be a neceſſity for raiſing more money to anſwer emergencies or pay the debts of the company, the partners muſt furniſh what is neceſſary, in proportion to their ſhares.

A debt to a company is not cancelled by the private debts of the partner; and, when a partner becomes inſolvent, the company is not bound for his debts beyond the extent of his ſhare.

The debts of the company are preferable, on the company's effects, to the private debts of the partners.

Partnerſhip is generally diſſolved by the death of a partner: yet, when there are more partners than two, it may, by agreement, ſubſiſt among the ſurvivors. Sometimes it is ſtipulated, that, in caſe of the death of a partner, his place ſhall be ſupplied by his ſon, or ſome other perſon condeſcended on. The contract ought to ſpecify the time and manner in which the ſurviving partners ſhall reckon with the executors of the deceaſed for his ſhare of the ſtock, and a reaſonable time allowed for that purpoſe.

When partnerſhip is diſſolved, there are often outſtanding debts that cannot be recovered for a long time, and effects that cannot eaſily be diſpoſed on. The partnerſhip, though diſſolved in other reſpects, ſtill ſubſiſts for the management of their outſtanding affairs; and the money ariſing from them is divided among the partners, or their repreſentatives, when it it is recovered. But, as this may protract the final ſettlement of the company's affairs to a very inconvenient length, other methods are ſometimes uſed to bring them to a concluſion, either in conſequence of the original contract, or by agreement at the time of diſſolution. Sometimes the debts and effects are ſold by auction; ſometimes they are divided among the partners; and, when there are two partners, one divides them into ſhares, as equal as poſſible, and the other chooſes either ſhare he thinks beſt.

If a partner withdraws, he continues reſponſible for his former partners till it be publicly known that he hath done ſo. A deed of ſeparation, regiſtrated at a public office, is ſufficient preſumption of ſuch notoriety.

III. Companies, where the buſineſs is conducted by officers. There are many companies of this kind in Britain, chiefly eſtabliſhed for purpoſes which require a larger capital than private merchants can command. The laws with reſpect to theſe companies, when not confirmed by public authority, are the ſame as the former, but the articles of their agreement uſually very different. The capital is condeſcended on; and divided into a certain number of ſhares, whereof each partner may hold one or more, but is generally reſtricted to a certain number. Any partner may transfer his ſhare; and the company muſt admit his aſſignee as a partner. The death of the partners has no effect on the company. No partner can act perſonally in the affairs of the company: but the execution of their buſineſs is intruſted to officers, for whom they are reſponſible; and, when the partners are numerous, the ſuperintendency of the officers is committed to directors choſen annually, or at other appointed times, by the partners.

IV. Companies incorporated by authority. A royal charter is neceſſary to enable a company to hold lands, to have a common ſeal, and enjoy the other privileges of a corporation. A charter is ſometimes procured, in order to limit the riſk of the partners: for, in every private company, the partners are liable for the debts, without limitation ; in corporated ſocieties, they are only liable for their ſhares in the ſtock of the ſociety. The incorporation of ſocieties is ſometimes authoriſed by act of parliament ; but this high authority is not neceſſary, unleſs for conferring excluſive privileges.

PARTRIDGE, in ornithology. See TETRAO.

The partridge is ſo valuable at the table, that a great many ways of taking it have been invented by ſportſmen, all of which ſucceed from the natural folly and timidity of the animal.

The places partridges delight in moſt are corn-fields, eſpecially whilſt the corn grows, for under that cover they ſhelter and breed : neither are thoſe places unfrequented by them when the corn is cut down, by reaſon of the grain they find there, eſpecially in wheat-ſtubble, the height of which they delight in, being to them as a covert or ſhelter. When the wheat-ſtubble is much trodden by men or beaſts, they then betake themſelves to the barley-ſtubble, provided it be freſh and untrodden ; and they will, in the furrows, amongſt the clots, branches, and long graſs, hide both themſelves and coveys, which are ſometimes 20 in number ; nay, 30 in a covey.

When the winter-ſeaſon is arrived, and the ſtubble-fields are ploughed up, or over-ſoiled with cattle, partridges reſort into the upland meadows, and lodge in the dead-graſs, or fog under hedges, amongſt mole-hills, or under the roots of trees ; ſometimes they reſort to coppices and under-woods, eſpecially if any corn-fields are adjacent, or where there is grown broom, brakes, fern, &c.

In the harveſt-time, when every field is full of men and cattle, in the day-time they are found in the fallow-fields which are next adjoining to the corn-fields, where they lie lurking till evening or morning, and then they feed among the ſheaves of corn.

When their haunts are known, according to the ſituation of the country and ſeaſon of the year, the next care muſt be to find them out in their haunts, which is done ſeveral ways. Some do it by the eye only ; and this art can never be taught, but learned by frequent experience, the colour of the birds being ſo like that of the earth at a diſtance, that no eye but a very converſant one could diſtinguiſh them. When they are once ſeen, the buſineſs is to keep the eye upon them, and then to keep in continual motion. They are a very lazy bird, and by this means will let a perſon almoſt tread upon them ; though if the perſon ſtands ſtill to eye them, they will riſe immediately, though they be at a conſiderable diſtance.

Another method of diſcovering them, is by going to their haunts very early in the morning, or at the cloſe of the evening, which is called the *jucking*-time. The noiſe of the cock-partride is to be attended to at this time, and is very loud and earneſt. The hen will ſoon come up to the cock after her making the noiſe, which ſhe does by way of anſwer; and when they are got together, their chattering will diſcover them. Thus they may always be found at theſe times. But there is a yet better method of finding this bird, which is by the *call*. The buſineſs, in order to have ſucceſs in this way, is carefully to learn the notes of the partridge, and be able to imitate all the ſeveral ſounds. When perfect in this, the perſon is to go to the haunts morning and evening, and placing himſelf in ſome place where he can ſee the birds without being ſeen by them, he is to liſten to their calling ; and when they are heard, he is to anſwer in the ſame notes, doubling again as they do : by continuing this, they may be brought ſo near, that the perſon lying down on his back may count their whole number. Having in this manner found where the birds are, the next care is to catch them.

They are ſo fooliſh, that it is extremely eaſy to take them in *nets*. In order to this, there needs no more than the going out, provided with two or three nets, with meſhes ſomewhat ſmaller than thoſe of the pheaſant nets, and walking round about the covey, a net is to be fixed ſo as to draw over them, on pulling a line at a diſtance. All this may be eaſily done ; for ſo long as the ſportſman continues moving about, and does not fix his eye too intenſely upon them, they will let him come near enough to fix the net, without moving. If they lie ſo ſtraggling, that one net will not cover them, then two or three muſt be fixed in the ſame manner. The ſportſman may then draw the nets over them, and they will often lie ſtill with the nets upon them till he comes up to fright them ; then they will riſe, and be entangled in the net.

A ſecond method of taking them is with *bird-lime*. this is done by means of wheat-ſtraws. Theſe muſt be large, and cut off between knot and knot; they muſt be well lined with the beſt and ſtrongeſt bird-lime, and the ſportmen muſt carry a great number out with him. Having found a field where there are partridges, he is to call ; and if they anſwer, he is then to ſtick up the limed ſtraws in rows acroſs two or three lands, and going backward, call again to them, leading them on in the road where the ſtraws are: they will follow one another like a flock of chickens, and come out to the call ; and will in their way run upon the ſtraws, and liming themſelves they will daub one another by crowding together, ſo that very few of them will be able to eſcape.

But there is yet a pleaſanter way of taking them than this, that is, by *driving* of them. In order to this, an engine is to be made of canvas ſtuffed with ſtraw, to repreſent a horſe; this horſe and nets are to be taken to the haunts of the partridges, and the nets being placed ſlanting or ſlopewiſe in the lower part of the field, the ſportſman is to take the wind in his back and get above them, driving them downwards; his face is to be covered with ſomething green or blue, and placing the horſe before him, he is to go towards them ſlowly and gently ; and by this means they will be raiſed on their legs, but not on their wings, and will run before the horſe into the nets. If in the way they go into a wrong path, the horſe is to be moved to face them; and they will be thus driven back again, and driven every way the ſportſman pleaſes.

PARTURITION, the art of bringing forth, or being delivered of, young. See MIDWIFERY.

PARTY, in a military ſenſe, a ſmall number of men, horſe, or foot, ſent upon any kind of duty; as into an enemy's country to pillage, to take priſoners, and to oblige the country to come under contribution. Parties are often ſent out to view the roads and ways, get intelligence, ſeek forage; to reconnoitre, or amuſe the enemy upon a march : they are alſo frequently ſent upon the flanks of an army or regiment, to diſcover the enemy if near, and prevent ſurpriſe or ambuſcade.

PARULIDES, in ſurgery, tumours and inflammations of the gums, commonly called *gum-boils*. They are to be treated with diſcutients like other inflammatory tumours.

PARUS, or Titmouse, in ornithology, a genus belonging to the order of paſſeres. The bill is very entire, covered at the baſis with hairs; the tongue is truncated and hairy. There are 14 ſpecies; of which the moſt remarkable are,

1. The criſtatus, or creſted titmouſe, weighs 13 pennyweight; the bill is black, with a ſpot of the ſame colour above it; all the upper part of the body gray; the neck and under parts are white, with a faint tincture of red, which is deepeſt juſt below the wings. The legs are of a lead colour. It erects its crown feathers into a creſt. It inhabits the warm parts of North America; and frequents foreſt-trees, feeding upon inſects.

2. The major, or great titmouſe, has the head and throat black, the cheeks white, the back of a green colour, the belly yellowiſh green, divided in the middle by a bed of black which extends to the vent; the rump of a bluiſh grey, the legs of a lead colour, the toes divided to the very origin, and the back-toe very large and ſtrong. This ſpecies ſometimes viſits our gardens; but for the moſt part inhabits woods, where it builds in hollow trees, laying about ten eggs. It feeds on inſects, which it finds in the bark of trees. In the ſpring they do a great deal of miſchief by picking off the tender buds of the fruit-trees. Like woodpeckers, they are perpetually running up and down the bodies of trees in queſt of food. This bird has three cheerful notes, which it begins to utter in the month of February.

3. The cœruleus, or blue titmouſe, is a very beautiful bird. The bill is ſhort and duſky; the crown of the head of a fine blue; from the bill to the eyes is a black line; the forehead and cheeks white; the back, of a yellowiſh green; the lower ſide of the body yellow; the wings and tail blue, the former marked tranſverſely with a white bar; the legs of a lead colour. They frequent gardens; and do great injury to fruit-trees, by bruiſing the tender buds in ſearch of the inſects which lie under them. It breeds in holes of walls, and lays 12 or 14 eggs.

4. The virginianus, or yellow rump, is found in Virginia; and is diſtinguiſhed by a yellow ſpot on its rump. All the reſt of the feathers are brown, with a ſlight tincture of green. It runs about the bodies of trees; and feeds on inſects, which it pecks from the crevices of the bark.

5. The caudatus, or long-tailed titmouſe, is about five inches and a quarter in length, and ſeven inches in breadth. The bill is black, very thick and convex, differing from all others of this genus. The top of the head, from the bill to the hind part, is white, mixed with a few dark-grey feathers: this bed of white is entirely ſurrounded with a broad ſtroke of black; which riſing on each ſide of the upper mandible, paſſes over each eye, unites at the hind part of the head, and continues along the middle of the back to the rump. The feathers on each ſide of this black ſtroke are of a purpliſh red, as are thoſe immediately incumbent on the tail. The tail is the longeſt, in proportion to the bulk, of any Britiſh bird, being in length three inches, the form not unlike that of a magpie, conſiſting of 12 feathers of unequal lengths, the middlemoſt the longeſt, thoſe on each ſide growing gradually ſhorter. Theſe birds are often ſeen paſſing through our gardens, going from one tree to another, as if in their road to ſome other place, never making any halt. They make their neſts with great elegance, of an oval ſhape, and about eight inches deep, having near the upper end a hole for admiſſion. The external materials are moſſes and lichens curiouſly interwoven with wool. On the inſide it is very warmly lined with a thick bed of feathers. The female lays from 10 to 17 eggs. The young follow their parents the whole winter; and, from the ſlimneſs of their bodies, and great length of tail, appear, while flying, like as many darts cutting the air.

6. The biarmicus, or bearded titmouſe, has a ſhort, ſtrong, and very convex bill, of a box colour; the head of a fine grey; the chin and throat white; the middle of the breaſt fleſh-coloured; the ſides and thighs of a pale orange; the hind part of the neck and back of orange bay; the tail is two inches and three quarters long; the legs of a deep ſhining black. The female wants the fleſh-colour on the breaſt, and a triangular tuft of black feathers on each ſide the bill which adorn the male. They are found in marſhy places.

PASCAL (Blaise), one of the greateſt geniuſes and beſt writers France has produced, was born at Clermont in Auvergne, in the year 1623. His father, Stephen Paſcal, born in 1588, and of an ancient family, was preſident of the court of aids in his province: he was a very learned man, an able mathematician, and a friend of Des Cartes. Having an extraordinary tenderneſs for this child, his only ſon, he quitted his office in his province, and went and ſettled at Paris in 1631, that he might be quite at leiſure for the inſtruction of him; and Blaiſe never had any maſter but his father. From his infancy he gave proofs of a very extraordinary capacity: for he deſired to know the reaſon of every thing; and when good reaſons were not given him, he would ſeek for better; nor would he ever yield his aſſent but upon ſuch as appeared to him well grounded. There was room to fear, that with ſuch a caſt of mind he would fall into free thinking, or at leaſt into heterodoxy; yet he was always very far from any thing of this nature.

What is told of his manner of learning the mathematics, as well as the progreſs he quickly made in that ſcience, ſeems almoſt miraculous. His father, perceiving in him an extraordinary inclination to reaſoning, was afraid leſt the knowledge of the mathematics would hinder his learning the languages. He kept him therefore as much as he could from all notions of geometry, locked up all his books of that kind, and refrained even from ſpeaking of it in his preſence. He could not, however, make his ſon refrain from muſing upon proportions; and one day ſurpriſed him at work with charcoal upon his chamber-floor, and in the midſt of figures. He aſked him what he was doing? I am ſearching, ſays Paſcal, for ſuch a thing; which was juſt the 32d propoſition of the firſt book of Euclid. He aſked him then how he came to think of this? It was, ſays Paſcal, becauſe I have found out ſuch another thing: and ſo going backward, and uſing the names of *bar* and *round*, he came at length to the definitions and axioms he had formed to himſelf. Does it not ſeem miraculous, that a boy ſhould work his way into the heart of a mathematical book, without ever having ſeen that or any other book upon the ſubject, or knowing any thing of the terms? Yet we are aſſured of the truth of this by Madam Perier, and ſeveral other writers, the credit of whoſe teſtimony cannot reaſonably be queſtioned. He had, from henceforward, full liberty to indulge his genius in mathematical purſuits. He underſtood Euclid's Elements as ſoon as he caſt his eyes upon them: and this was not ſtrange; for, as we have ſeen, he underſtood them before. At 16 years of age he wrote a treatiſe of conic ſections, which was accounted by the moſt learned a mighty effort of genius; and therefore it is no wonder that Des Cartes, who had been in Holland a long time, ſhould, upon reading it, chooſe to believe, that Mr Paſcal, the father, was the real author of it. At nineteen, he contrived an admirable arithmetical machine, which was eſteemed a very wonderful thing: and at twenty-three, having ſeen the Torricellian experiment, he invented and tried a great number of other new experiments.

After he had laboured abundantly in mathematical and philoſophical diſquiſitions, he forſook thoſe ſtudies and all human learning at once; and determined to know nothing, as it were, for the future, but Jeſus Chriſt and him crucified. He was not 24 years of age, when the reading ſome pious books had put him upon taking this holy reſolution; and he became as great a devotee as any age has produced. Mr Paſcal now gave himſelf up entirely to a ſtate of prayer and mortification. He had always in his thoughts theſe great maxims, of renouncing all pleaſure and all ſuperfluity; and this he practiſed with rigour even in his illneſſes, to which he was frequently ſubject, being of a very invalid habit of body: for inſtance, when his ſickneſs obliged him to feed ſomewhat delicately, he took great care not to reliſh or taſte what he eat. He had no violent affection for thoſe he loved; he thought it ſinful, ſince a man poſſeſſes a heart which belongs only to God. He found fault with ſome diſcourſes of his ſiſter, which ſhe thought very innocent; as if ſhe had ſaid upon occaſion, that ſhe had ſeen a beautiful woman, he would be angry, and tell her, that ſhe might raiſe bad thoughts in footmen and young people. He frequently wore an iron girdle full of points next to his ſkin; and when any vain thought came into his head, or when he took particular pleaſure in any thing, he gave himſelf ſome blows with his elbow, to redouble the prickings, and to recall himſelf to his duty.

Though Mr Paſcal had thus abſtracted himſelf from the world, yet he could not forbear paying ſome attention to what was doing in it; and he even intereſted himſelf in the conteſt between the Jeſuits and the Janſeniſts. The Jeſuits, though they had the popes and kings on their ſide, were yet decried by the people, who brought up afreſh againſt them the aſſaſſination of Henry the Great, and all the old ſtories that were likely to make them odious. Paſcal went farther; and by his *Lettres Provinciales*, publiſhed in 1656, under the name of *Louis de Montalte*, made them the ſubject of ridicule. "Theſe letters," ſays Voltaire, "may be conſidered as a model of eloquence and humour. The beſt comedies of Moliere have not more wit than the firſt part of theſe letters; and the ſublimity of the latter part of them is equal to any thing in Boſſuet. It is true, indeed, that the whole book was built upon a falſe foundation; for the extravagant notions of a few Spaniſh and Flemiſh Jeſuits were artfully aſcribed to the whole ſociety. Many abſurdities might likewiſe have been diſcovered among the Dominican and Franciſcan caſuiſts: but this would not have anſwered the purpoſe; for the whole raillery was to be levelled only at the Jeſuits. Theſe letters were intended to prove, that the Jeſuits had formed a deſign to corrupt mankind; a deſign which no ſect or ſociety ever had, or can have" Voltaire calls Paſcal the firſt of their ſatyriſts; for Deſpreaux, ſays he, muſt be conſidered as only the ſecond. In another place, ſpeaking of this work of Paſcal, he ſays, that "examples of all the various ſpecies of eloquence are to be found in it. Though it has been now written almoſt 100 years, yet not a ſingle word occurs in it, ſavouring of that viciſſitude to which living languages are ſo ſubject. Here then we are to fix the epocha when our language may be ſaid to have aſſumed a ſettled form. The biſhop of Lucon, ſon of the celebrated Buſſy, told me, that aſking one day the biſhop of Meaux what work he would covet moſt to be the author of, ſuppoſing his own performances ſet aſide, Boſſuet replied, The Provincial Letters." Theſe letters have been tranſlated into all languages, and printed over and over again. Some have ſaid, that there were decrees of formal condemnation againſt them; and alſo that Paſcal himſelf, in his laſt illneſs, deteſted them, and repented of having been a Janſeniſt: but both theſe particulars are falſe and without foundation. Father Daniel was ſuppoſed to be the anonymous author of a piece againſt them, intitled, *The Dialogues of Cleander and Eudoxus*.

Mr Paſcal died at Paris the 19th of Auguſt 1662, aged 39 years. He had been ſome time about a work againſt atheiſts and infidels, but did not live long enough to digeſt the materials he had collected. What was found among his papers was publiſhed under the title of *Penſees*, &c. or *Thoughts upon religion and other ſubjects*, and has been much admired. After his death appeared alſo two other little tracts; one of which is intitled, *The equilibrium of fluids*; and the other, *The weight of the maſs of air*.

To conclude, Mr Paſcal was, all things conſidered, a man of a moſt ſingular compoſition; or, as Mr Bayle ſays, "a parodoxical individuum of the human kind."

PASCHAL, ſomething belonging to the paſſover, or Eaſter. See Passover and Easter.

PASIPHAE, in fabulous hiſtory, the daughter of Apollo, and the wife of Minos, king of Crete, by whom ſhe had Androgeos, Ariadne, and Phædra. She conceived a violent paſſion for a bull; and had by him the Minotaur, which was kept in the labyrinth, where it was killed by Theſeus.

PASQUIN, a mutilated ſtatute at Rome, in a corner of the palace of the Urſini. It takes its name from a cobler of that city called *Paſquin*, famous for his ſneers and gibes, and who diverted himſelf by paſſing his jokes on all that went through that ſtreet.

After his death, as they were digging up the pavement before his door, they found in the earth the ſtatue of an ancient gladiator, well cut, but maimed and half-ſpoiled: this they ſet up in the place where it was found, and by common conſent named it *Paſquin*. Since that time all ſatires are attributed to that figure; and are either put into its mouth, or paſted upon it, as if they were written by Paſquin redivivus; and theſe are addreſſed by Paſquin to Marforio, another ſtatue at Rome. When Marſorio is attacked, Paſquin comes to his aſſiſtance; and, when Paſquin is attacked, Marforio aſſiſts him in his turn: that is, the people make the ſtatues ſpeak juſt what they pleaſe.

PASQUINADE, a ſatirical libel faſtened to the ſtatue of Paſquin: theſe are commonly ſhort, witty, and pointed; and from hence the term has been applied to all lampoons of the ſame caſt.

PASS, or PASSADE, in fencing; an advance, or leap forward upon the enemy. Of theſe there are ſeveral kinds; as paſſes within, above, beneath, to the right, the left, and paſſes under the line, &c. The meaſure of the paſs is when the ſwords are ſo near as that they may touch one another.

PASS, in a military ſenſe, a ſtrait and difficult paſſage, which ſhuts up the entrance into a country.

PASS *Parole*, in military affiairs, a command given at the head of an army, and thence communicated to the rear, by paſſing it from mouth to mouth.

PASSADE, in the manege, is a turn or courſe of a horſe backwards or forwards on the ſame ſpot of ground. Hence there are ſeveral ſorts of paſſades, according to the different ways of turning, in order to part or return upon the ſame tread, which is called *cloſing the paſſade*; as the paſſade of one time, the paſſade of five times, and the raiſed or high paſſades, into which the demivolts are made into curvets. See HORSEMANSHIP.

North-weſt PASSAGE. }
North-eaſt PASSAGE. } See POLE.

Right of PASSAGE, in commerce, is an impoſition or duty exacted by ſome princes, either by land or ſea, in certain cloſe and narrow places in their territories, on all veſſels and carriages, and even ſometimes on perſons or paſſengers coming in or going out of ports, &c. The moſt celebrated paſſage of this kind in Europe is the Sound; the dues for paſſing which ſtrait belong to the king of Denmark, and are paid at Elſenore or Cronenburg.

PASSANT, in herald, a term applied to a lion or other animal in a ſhield, appearing to walk leiſurely: for moſt beaſts, except lions, the *trippant* is frequently uſed inſtead of *paſſant*.

PASSAU, an ancient, handſome, and celebrated town of Germany, in lower Bavaria, with a biſhop's ſee and fort. The houſes are well built, and the cathedral is thought to be the fineſt in all Germany. It is divided into four parts, three of which are fortified; but the other is only a ſuburb, and has nothing but an old caſtle in which the biſhop generally reſides. It is ſeated at the confluence of the rivers Inn and Iltz, in E. Long. 13. 34. N. Lat. 48. 26.

PASSAU, a biſhopric of Germany, lying between Lower Bavaria, Auſtria, and Bohemia. It extends not above 20 miles where largeſt; and has no conſiderable place, except the capital which is of the ſame name.

PASSERAT (John), a celebrated profeſſor of eloquence in the royal college of Paris, and one of the politeſt writers of his time, was born at Troyes in the province of Champagne, in 1534. He ſpent three years in ſtudying the law under the famous Cujacius at Bourges, where he became profeſſor of eloquence in 1572. He was an indefatigable ſtudent, paſſing frequently whole days without eating a morſel; yet to an extraordinary erudition he joined an uncommon politeneſs of manners and pleaſantry, having nothing of the mere ſcholar except the gown and hood. He gained the eſteem of the kings Charles IX. Henry III. and of all the men of wit and learning in his time. He died in 1602, and left ſeveral admired works behind him.

PASSERES, the name of a claſs of birds. See ZOOLOGY.

PASSIONS, in moral philoſophy, are certain motions of the ſoul, which make it purſue what appears to be good, and avoid whatever threatens evil. See METAPHYSICS, n° 31, 32.

On the juſt regulation and ſubordination of the paſſions depends in a great meaſure the happineſs of mankind. See MORAL *Philoſophy*, n° 6, 17, 31, 32, 68, 212.

PASSIONS *and Emotions*, difference between them. See EMOTIONS *and Paſſions*.

External Signs of Emotions and PASSIONS. So intimately connected are the ſoul and body, that every agitation in the former produces a viſible effect upon the latter. There is, at the ſame time, a wonderful uniformity in that operation; each claſs of emotions and paſſions being invariably attended with an external appearance peculiar to itſelf. Theſe external appearances, or ſigns, may not improperly be conſidered as a natural language, expreſſing to all beholders emotions and paſſions as they ariſe in the heart. Hope, fear, joy, grief, are diſplayed externally: the character of a man can be read in his face; and beauty, which makes ſo deep an impreſſion, is known to reſult, not ſo much from regular features and a fine complexion, as from good-nature, good-ſenſe, ſprightlineſs, ſweetneſs, or other mental quality, expreſſed upon the countenance. Though perfect ſkill in that language be rare, yet what is generally known is ſufficient for the ordinary purpoſes of life. But by what means we come to underſtand the language, is a point of ſome intricacy. It cannot be by ſight merely; for upon the moſt attentive inſpection of the human viſage, all that can be diſcerned are figure, colour, and motion, which, ſingly or combined, never can repreſent a paſſion, nor a ſentiment: the external ſign is indeed viſible; but to underſtand its meaning, we muſt be able to connect it with the the paſſion that cauſes it, an operation far beyond the reach of eye-ſight. Where then is the inſtructor to be found that can unveil this ſecret connection? If we apply to experience, it is yielded, that from long and diligent obſervation, we may gather, in ſome meaſure, in what manner thoſe we are acquainted with expreſs their paſſions externally: but with reſpect to ſtrangers, we are left in the dark; and yet we are not puzzled about the meaning of theſe external expreſſions in a ſtranger, more than in a boſom-companion. Further, had we no other means but experience for underſtanding the external ſigns of paſſion, we could not expect any uniformity nor any degree of ſkill in the bulk of individuals: yet matters are ſo much better ordered, that the external expreſſions of paſſion form a language underſtood by all, by the young as well as the old, by the ignorant as well as the learned: We talk of the plain and legible characters of that language; for undoubtedly we are much indebted to experience, in deciphering the dark and more delicate expreſſions. Where then ſhall we apply for a ſolution of this intricate problem, which ſeems to penetrate deep into human nature? Undoubtedly if the meaning of external ſigns be not derived to us from ſight, nor from experience, there is no remaining ſource whence it can be derived but from nature.

Elements of Criticiſm.

We may then venture to pronounce, with ſome degree of confidence, that man is provided by nature with a ſenſe or faculty that lays open to him every paſſion by means of its external expreſſions. And we cannot entertain any reaſonable doubt of this, when we reflect, that the meaning of external ſigns is not hid even from infants: an infant is remarkably affected with the paſſions of its nurſe expreſſed on her countenance; a ſmile chears it, a frown makes it afraid: but fear cannot be without apprehending danger; and what danger can the infant apprehend, unleſs it be ſenſible that its nurſe is angry? We muſt therefore admit, that a child can read anger in its nurſe's face; of which it muſt be ſenſible intuitively, for it has no other mean of knowledge. We do not affirm, that theſe particulars are clearly apprehended by the child; for to produce clear and diſtinct perceptions, reflection and experience are requiſite: but that even an infant, when afraid, muſt have ſome notion of its being in danger, is evident.

That we ſhould be conſcious intuitively of a paſſion from its external expreſſions, is conformable to the analogy of nature: the knowledge of that language is of too great importance to be left upon experience; becauſe a foundation ſo uncertain and precarious, would prove a great obſtacle to the formation of ſocieties. Wiſely therefore is it ordered, and agreeably to the ſyſtem of Providence, that we ſhould have nature for our inſtructor.

Manifold and admirable are the purpoſes to which the external ſigns of paſſion are made ſubſervient by the Author of our nature.

1. The ſigns of internal agitation diſplayed externally to every ſpectator, tend to fix the ſignification of many words. The only effectual means to aſcertain the meaning of any doubtful word, is an appeal to the thing it repreſents: and hence the ambiguity of words expreſſive of things that are not objects of external ſenſe; for in that caſe an appeal is denied. Paſſion, ſtrictly ſpeaking, is not an object of external ſenſe: but its external ſigns are; and by means of theſe ſigns, paſſions may be appealed to with tolerable accuracy: thus the words that denote our paſſions, next to thoſe that denote external objects, have the moſt diſtinct meaning. Words ſignifying internal action and the more delicate feelings, are leſs diſtinct. This defect with regard to internal action, is what chiefly occaſions the intricacy of logic: the terms of that ſcience are far from being ſufficiently aſcertained, even after much care and labour beſtowed by an eminent writer*; to whom however the world is greatly indebted, for removing a mountain of rubbiſh, and moulding the ſubject into a rational and correct form. The ſame defect is remarkable in criticiſm, which has for its object the more delicate feelings; the terms that denote theſe feelings being not more diſtinct than thoſe of logic.

2. Society among individuals is greatly promoted by that univerſal language. Looks and geſtures give direct acceſs to the heart; and lead us to ſelect, with tolerable accuracy, the perſons who are worthy of our confidence. It is ſurpriſing how quickly, and for the moſt part how correctly, we judge of character from external appearance.

3. After ſocial intercourſe is commenced, theſe external ſigns, which diffuſe through a whole aſſembly the feelings of each individual, contribute above all other means to improve the ſocial affections. Language, no doubt, is the moſt comprehenſive vehicle for communicating emotions: but in expedition, as well as in power of conviction, it falls ſhort of the ſigns under conſideration; the involuntary ſigns eſpecially, which are incapable of deceit. Where the countenance, the tones, the geſtures, the actions, join with the words in communicating emotions, theſe united have a force irreſiſtible: thus all the pleaſant emotions of the human heart, with all the ſocial and virtuous affections, are, by means of theſe external ſigns, not only perceived, but felt. By this admirable contrivance, converſation becomes that lively and animating amuſement, without which life would at beſt be inſipid: one joyful countenance ſpreads chearfulneſs inſtantaneouſly through a multitude of ſpectators.

4. Diſſocial paſſions, being hurtful by prompting violence and miſchief, are noted by the moſt conſpicuous external ſigns, in order to put us upon our guard: thus anger and revenge, eſpecially when ſudden, diſplay themſelves on the countenance in legible character. The external ſigns, again, of every paſſion that threatens danger, raiſe in us the paſſion of fear: which frequently operating without reaſon or reflection, moves us by a ſudden impulſe to avoid the impending danger.

5. Theſe external ſigns are remarkably ſubſervient to morality. A painful paſſion, being accompanied with diſagreeable external ſigns, muſt produce in every ſpectator a painful emotion: but then, if the paſſion be ſocial, the emotion it produces is attractive, and connects the ſpectator with the perſon who ſuffers. Diſſocial paſſions only, are productive of repulſive emotions, involving the ſpectator's averſion, and frequently his indignation. This artful contrivance makes us cling to the virtuous, and abhor the wicked.

6. Of all the external ſigns of paſſion, thoſe of affliction or diſtreſs are the moſt illuſtrious with reſpect to a final cauſe, and deſervedly merit a place of diſtinction. They are illuſtrious by the ſingularity of their contrivance; and alſo by inſpiring ſympathy, a paſſion to which human ſociety is indebted for its greateſt bleſſing, that of providing relief for the diſtreſſed. A ſubject ſo intereſting, deſerves a leiſurely and attentive examination. The conformity of the na-

---

* Locke.

ture of man to his external circumſtances, is in every particular wonderful: his nature makes him prone to ſociety; and ſociety is neceſſary to his well-being, becauſe in a ſolitary ſtate he is a helpleſs being, deſtitute of ſupport, and in his diſtreſſes deſtitute of relief: but mental ſupport, the ſhining attribute of ſociety, is of too great moment to be left dependent upon cool reaſon; it is ordered more wiſely, and with greater conformity to the analogy of nature, that it ſhould be enforced even inſtinctively by the paſſion of ſympathy. Here ſympathy makes a capital figure; and contributes, more than any other means, to make life eaſy and comfortable. But however eſſential the ſympathy of others may be to our well-being, one beforehand would not readily conceive how it could be raiſed by external ſigns of diſtreſs: for conſidering the analogy of nature, if theſe ſigns be agreeable, they muſt give birth to a pleaſant emotion leading every beholder to be pleaſed with human woes: if diſagreeable, as they undoubtedly are, ought they not naturally to repel the ſpectator from them, in order to be relieved from pain? Such would be the reaſoning beforehand; and ſuch would be the effect were man purely a ſelfiſh being. But the benevolence of our nature gives a very different direction to the painful paſſion of ſympathy, and to the deſire involved in it: inſtead of avoiding diſtreſs, we fly to it in order to afford relief; and our ſympathy cannot be otherwiſe gratified but by giving all the ſuccour in our power. Thus external ſigns of diſtreſs, though diſagreeable, are attractive: and the ſympathy they inſpire is a powerful cauſe, impelling us to afford relief even to a ſtranger, as if he were our friend or relation.

It is a noted obſervation, that the deepeſt tragedies are the moſt crowded: which in an overly view will be thought an unaccountable bias in human nature. Love of novelty, deſire of occupation, beauty of action, make us fond of theatrical repreſentations; and when once engaged, we muſt follow the ſtory to the concluſion, whatever diſtreſs it may create. But we generally become wiſe by experience; and when we foreſee what pain we ſhall ſuffer during the courſe of the repreſentation, is it not ſurpriſing that perſons of reflection do not avoid ſuch ſpectacles altogether? And yet one who has ſcarce recovered from the diſtreſs of a deep tragedy, reſolves coolly and deliberately to go to the very next, without the ſlighteſt obſtruction from ſelf-love. The whole myſtery is explained by a ſingle obſervation: That ſympathy, though painful, is attractive; and attaches us to an object in diſtreſs, inſtead of prompting us to fly from it. And by this curious mechaniſm it is, that perſons of any degree of ſenſibility are attracted by affliction ſtill more than by joy.

To conclude: the external ſigns of paſſion are a ſtrong indication, that man, by his very conſtitution, is framed to be open and ſincere. A child, in all things obedient to the impulſes of nature, hides none of its emotions; the ſavage and clown, who have no guide but pure nature, expoſe their hearts to view, by giving way to all the natural ſigns. And even when men learn to diſſemble their ſentiments, and when behaviour degenerates into art, there ſtill remain checks, that keep diſſimulation within bounds, and prevent a great part of its miſchievous effects; the total ſuppreſſion of the voluntary ſigns during any vivid paſſion, begets the utmoſt uneaſineſs, which cannot be endured for any conſiderable time: this operation becomes indeed leſs painful by habit; but luckily the involuntary ſigns cannot, by any effort, be ſuppreſſed nor even diſſembled. An abſolute hypocriſy, by which the character is concealed and a fictitious one aſſumed, is made impracticable; and nature has thereby prevented much harm to ſociety. We may pronounce, therefore, that Nature, herſelf ſincere and candid, intends that mankind ſhould preſerve the ſame character, by cultivating ſimplicity and truth, and baniſhing every ſort of diſſimulation that tends to miſchief.

Influence of PASSION *with reſpect to our Perceptions, Opinions, and Belief.* So intimately are our perceptions, paſſions, and actions, connected, it would be wonderful if they ſhould have no mutual influence. That our actions are too much influenced by paſſion, is a known truth; but it is not leſs certain, though not ſo well known, that paſſion hath alſo an influence upon our perceptions, opinions, and belief. For example, the opinions we form of men and things are generally directed by affection: An advice given by a man of figure hath great weight; the ſame advice from one in a low condition is deſpiſed or neglected: a man of courage under-rates danger; and to the indolent the ſlighteſt obſtacle appears unſurmountable.

There is no truth more univerſally known, than that tranquillity and ſedateneſs are the proper ſtate of mind for accurate perception and cool deliberation; and for that reaſon, we never regard the opinion even of the wiſeſt man, when we diſcover prejudice or paſſion behind the curtain. Paſſion hath ſuch influence over us, as to give a falſe light to all its objects. Agreeable paſſions prepoſſeſs the mind in favour of their objects; and diſagreeable paſſions, not leſs againſt their objects: A woman is all perfection in her lover's opinion, while in the eye of a rival beauty ſhe is aukward and diſagreeable: when the paſſion of love is gone, beauty vaniſhes with it;—nothing left of that genteel motion, that ſprightly converſation, thoſe numberleſs graces, which formerly, in the lover's opinion, charmed all hearts. To a zealot every one of his own ſect is a ſaint, while the moſt upright of a different ſect are to him children of perdition: the talent of ſpeaking in a friend, is more regarded than prudent conduct in any other. Nor will this ſurpriſe any one acquainted with the world; our opinions, the reſult frequently of various and complicated views, are commonly ſo ſlight and wavering, as readily to be ſuſceptible of a bias from paſſion.

Elements of Criticiſm, vol. i. p. 152, &c.

With that natural bias another circumſtance concurs, to give paſſion an undue influence on our opinions and belief; and that is a ſtrong tendency in our nature to juſtify our paſſions as well as our actions, not to others only, but even to ourſelves. That tendency is peculiarly remarkable with reſpect to diſagreeable paſſions: by its influence, objects are magnified or leſſened, circumſtances ſupplied or ſuppreſſed, every thing coloured and diſguiſed, to anſwer the end of juſtification. Hence the foundation of ſelf-deceit, where a man impoſes upon himſelf innocently, and even without ſuſpicion of a bias.

We proceed to illuſtrate the foregoing obſervations by proper examples.

Gratitude, when warm, is often exerted upon the children of the benefactor; eſpecially where he is removed out of reach by death or abſence. The paſſion in this caſe being exerted for the ſake of the benefactor, requires no peculiar excellence in his children: but the practice of doing good to theſe children produces affection for them, which never fails to advance them in our eſteem. By ſuch means, ſtrong connections of affection are often formed among individuals, upon the ſlight foundation now mentioned.

Envy is a paſſion, which, being altogether unjuſtifiable, cannot be excuſed but by diſguiſing it under ſome plauſible name. At the ſame time, no paſſion is more eager than envy, to give its object a diſagreeable appearance: it magnifies every bad quality, and fixes on the moſt humbling circumſtances:

Caſſius. I cannot tell what you and other men
Think of this life; but for my ſingle ſelf,
I had as lief not be, as live to be
In awe of ſuch a thing as I myſelf.
I was born free as Cæſar, ſo were you;
We both have fed as well; and we can both
Endure the winter's cold as well as he.
For once, upon a raw and guſty day,
The troubled Tyber chafing with his ſhores,
Cæſar ſays to me, Dar'ſt thou, Caſſius, now
Leap in with me into this angry flood,
And ſwim to yonder point?—Upon the word,
Accoutred as I was, I plunged in,
And bid him follow; ſo indeed he did.
The torrent roar'd, and we did buffet it
With luſty ſinews; throwing it aſide,
And ſtemming it with hearts of controverſy.
But ere we could arrive the point propoſ'd,
Cæſar cry'd, Help me, Caſſius, or I ſink.
I, as Æneas, our great anceſtor,
Did from the flames of Troy upon his ſhoulder
The old Anchiſes bear; ſo from the waves of Tyber
Did I the tired Cæſar: and this man
Is now become a god; and Caſſius is
A wretched creature, and muſt bend his body
If Cæſar careleſsly but nod on him.
He had a fever when he was in Spain;
And when the fit was on him, I did mark
How he did ſhake. 'Tis true, this god did ſhake;
His coward lips did from their colour fly;
And that ſame eye whoſe bend doth awe the world,
Did loſe its luſtre; I did hear him groan;
Ay, and that tongue of his, that bade the Romans
Mark him, and write his ſpeeches in their books,
Alas! it cry'd—Give me ſome drink, Titinius,—
As a ſick girl. Ye gods, it doth amaze me,
A man of ſuch a feeble temper ſhould
So get the ſtart of the majeſtic world,
And bear the palm alone. *Julius Cæſar, act* 1. *ſc.* 3.

Glo'ſter, inflamed with reſentment againſt his ſon Edgar, could even force himſelf into a momentary conviction that they were not related:

O ſtrange faſten'd villain!
Would he deny his letter?—I never got him.
King Lear, act 2. *ſc.* 3.

When by great ſenſibility of heart, or other means, grief becomes immoderate, the mind, in order to juſtify itſelf, is prone to magnify the cauſe; and if the real cauſe admit not of being magnified, the mind ſeeks a cauſe for its grief in imagined future events:

Buſhy. Madam, your Majeſty is much too ſad:
You promis'd, when you parted with the king,
To lay aſide ſelf-harming heavineſs,
And entertain a cheerful diſpoſition.
Queen. To pleaſe the king, I did; to pleaſe myſelf,
I cannot do it. Yet I know no cauſe
Why I ſhould welcome ſuch a gueſt as grief;
Save bidding farewell to ſo ſweet a gueſt
As my ſweet Richard: yet again, methinks,
Some unborn ſorrow, ripe in Fortune's womb,
Is coming tow'rd me: and my inward ſoul
With ſomething trembles, yet at nothing grieves,
More than with parting from my lord the king.
Richard II. *act* 2. *ſc.* 5.

Reſentment at firſt is vented on the relations of the offender, in order to puniſh him: but as reſentment, when ſo outrageous, is contrary to conſcience, the mind, to juſtify its paſſion, is diſpoſed to paint theſe relations in the blackeſt colours; and it comes at laſt to be convinced, that they ought to be puniſhed for their own demerits.

Anger raiſed by an accidental ſtroke upon a tender part of the body, is ſometimes vented upon the undeſigning cauſe. But as the paſſion in that caſe is abſurd, and as there can be no ſolid gratification in puniſhing the innocent, the mind, prone to juſtify as well as to gratify its paſſion, deludes itſelf into a conviction of the action's being voluntary. The conviction, however, is but momentary; the firſt reflection ſhows it to be erroneous: and the paſſion vaniſheth almoſt inſtantaneouſly with the conviction. But anger, the moſt violent of all paſſions, has ſtill greater influence: it ſometimes forces the mind to perſonify a ſtock or a ſtone if it happen to occaſion bodily pain, and even to believe it a voluntary agent, in order to be a proper object of reſentment. And that we have really a momentary conviction of its being a voluntary agent, muſt be evident from conſidering, that without ſuch conviction the paſſion can neither be juſtified nor gratified: the imagination can give no aid; for a ſtock or a ſtone imagined ſenſible, cannot be an object of puniſhment, if the mind be conſcious that it is an imagination merely without any reality. Of ſuch perſonification, involving a conviction of reality, there is one illuſtrious inſtance. When the firſt bridge of boats over the Helleſpont was deſtroyed by a ſtorm, Xerxes fell into a tranſport of rage, ſo exceſſive, that he commanded the ſea to be puniſhed with 300 ſtripes; and a pair of fetters to be thrown into it, enjoining the following words to be pronounced: "O thou ſalt and bitter water! thy maſter hath condemned thee to this puniſhment for offending him without cauſe; and is reſolved to paſs over thee in deſpight of thy inſolence: with reaſon all men neglect to ſacrifice to thee, becauſe thou art both diſagreeable and treacherous."

Herodo lib. 7.

Shakeſpeare exhibits beautiful examples of the irregular influence of paſſion in making us believe things to be otherwiſe than they are. King Lear, in his diſtreſs, perſonifies the rain, wind, and thunder; and in order to juſtify his reſentment, believes them to be taking part with his daughters:

Lear. Rumble thy bellyfull, ſpit fire, ſpout rain!

Nor rain, wind, thunder, fire, are my daughters.
I tax not you, ye elements, with unkindneſs;
I never gave you kingdoms, call'd you children;
You owe me no ſubſcription. Then let fall
Your horrible pleaſure.—Here I ſtand, your brave;
A poor, infirm, weak, and deſpis'd old man!
But yet I call you ſervile miniſters,
That have with two pernicious daughters join'd
Your high-engender'd battles, 'gainſt a head
So old and white as this. Oh! oh! 'tis foul!
Act 3. *ſc.* 2.

King Richard, full of indignation againſt his favourite horſe for carrying Bolingbroke, is led into the conviction of his being rational:

Groom. O, how it yearn'd my heart, when I beheld
In London ſtreets, that coronation-day,
When Bolingbroke rode on Roan Barbary,
That horſe that thou ſo often haſt beſtrid,
That horſe that I ſo carefully have dreſſed.
K. Rich. Rode he on Barbary? tell me, gentle friend,
How went he under him?
Groom. So proudly as he had diſdain'd the ground.
K. Rich. So proud that Bolingbroke was on his back!
That jade had eat bread from my royal hand.
This hand hath made him proud with clapping him.
Would he not ſtumble? would he not fall down,
(Since pride muſt have a fall), and break the neck
Of that proud man that did uſurp his back?
Richard II. *act* 5. *ſc.* 11.

Hamlet, ſwelled with indignation at his mother's ſecond marriage, was ſtrongly inclined to leſſen the time of her widowhood, the ſhortneſs of the time being a violent circumſtance againſt her; and he deludes himſelf by degrees into the opinion of an interval ſhorter than the real one:

Hamlet.——————That it ſhould come to this!
But two months dead! nay, not ſo much; not two—
So excellent a king, that was, to this,
Hyperion to a ſatyr: ſo loving to my mother,
That he permitted not the wind of heav'n
Viſit her face too roughly. Heav'n and earth!
Muſt I remember—why, ſhe would hang on him,
As if increaſe of appetite had grown
By what it fed on: yet, within a month——
Let me not think—Frailty, thy name is *Woman!*
A little month! or ere thoſe ſhoes were old,
With which ſhe follow'd my poor father's body,
Like Niobe, all tears——why ſhe, ev'n ſhe—
(O heav'n! a beaſt, that wants diſcourſe of reaſon,
Wou'd have mourn'd longer) married with mine uncle,
My father's brother; but no more like my father,
Than I to Hercules. Within a month!—
Ere yet the ſalt of moſt unrighteous tears
Had left the fluſhing in her gauled eyes,
She married——Oh, moſt wicked ſpeed! to poſt
With ſuch dexterity to inceſtuous ſheets!
It is not, nor it cannot come to good.
But break, my heart, for I muſt hold my tongue.
Act 1. *ſc.* 3.

The power of paſſion to falſify the computation of time is remarkable in this inſtance; becauſe time, which hath an accurate meaſure, is leſs obſequious to our deſires and wiſhes, than objects which have no preciſe ſtandard of leſs or more.

Good news are greedily ſwallowed upon very ſlender evidence; our wiſhes magnify the probability of the event, as well as the veracity of the relater; and we believe as certain, what at beſt is doubtful:

Quel, che l' huom vede, amor li fa inviſible
E l' inviſibil fa veder amore.
Queſto creduto fu, che 'l miſer ſuole
Dar facile credenza a' quel, che vuole.
Orland. Furioſ. cant. 1. *ſt.* 56.

For the ſame reaſon, bad news gain alſo credit upon the ſlighteſt evidence: fear, if once alarmed, has the ſame effect with hope, to magnify every circumſtance that tends to conviction. Shakeſpeare, who ſhows more knowledge of human nature than any of our philoſophers, hath in his Cymbeline repreſented this bias of the mind; for he makes the perſon who alone was affected with the bad news, yield to evidence that did not convince any of his companions. And Othello is convinced of his wife's infidelity from circumſtances too ſlight to move any perſon leſs intereſted.

If the news intereſt us in ſo low a degree as to give place to reaſon, the effect will not be altogether the ſame: judging of the probability or improbability of the ſtory, the mind ſettles in a rational conviction either that it is true or not. But even in that caſe, the mind is not allowed to reſt in that degree of conviction which is produced by rational evidence: if the news be in any degree favourable, our belief is raiſed by hope to an improper height; and if unfavourable, by fear.

This obſervation holds equally with reſpect to future events: if a future event be either much wiſhed or dreaded, the mind never fails to augment the probability beyond truth.

That eaſineſs of belief with reſpect to wonders and prodigies, even the moſt abſurd and ridiculous, is a ſtrange phenomenon; becauſe nothing can be more evident than the following propoſition, That the more ſingular any event is, the more evidence is required to produce belief: a familiar event daily occurring, being in itſelf extremely probable, finds ready credit, and therefore is vouched by the ſlighteſt evidence; but to overcome the improbability of a ſtrange and rare event, contrary to the courſe of nature, the very ſtrongeſt evidence is required. It is certain, however, that wonders and prodigies are ſwallowed by the vulgar, upon evidence that would not be ſufficient to aſcertain the moſt familiar occurrence. It has been reckoned difficult to explain that irregular bias of mind; but we are now made acquainted with the influence of paſſion upon opinion and belief: a ſtory of ghoſts or fairies, told with an air of gravity and truth, raiſeth an emotion of wonder, and perhaps of dread; and theſe emotions impoſing on a weak mind, impreſs upon it a thorough conviction contrary to reaſon.

Opinion and belief are influenced by propenſity as well as by paſſion. An innate propenſity is all we have to convince us that the operations of nature are uniform: influenced by that propenſity, we often raſhly think, that good or bad weather will never have an end; and in natural philoſophy, writers, influenced by the ſame propenſity, ſtretch commonly their analogical reaſonings beyond juſt bounds.

Opinion and belief are influenced by affection as well as by propenſity. The noted ſtory of a fine lady and a curate viewing the moon through a teleſcope, is a pleaſant illuſtration: "I perceive," ſays the lady, "two ſhadows inclining to each other; they are certainly two happy lovers:" "Not at all," replies the curate, "they are two ſteeples of a cathedral."

Language of PASSION. Among the particulars that compoſe the ſocial part of our nature, a propenſity to communicate our opinions, our emotions, and every thing that affects us, is remarkable. Bad fortune and injuſtice affect us greatly; and of theſe we are ſo prone to complain, that if we have no friend nor acquaintance to take part in our ſufferings, we ſometimes utter our complaints aloud, even where there are none to liſten.

But this propenſity operates not in every ſtate of mind. A man immoderately grieved, ſeeks to afflict himſelf, rejecting all conſolation: immoderate grief accordingly is mute; complaining is ſtruggling for conſolation.

It is the wretch's comfort ſtill to have
Some ſmall reſerve of near and inward wo,
Some unſuſpected hoard of inward grief,
Which they unſeen may wail, and weep, and mourn,
And glutton-like alone devour.

Mourning Bride, act 1. *ſc.* 1.

When grief ſubſides, it then, and no ſooner, finds a tongue: we complain, becauſe complaining is an effort to diſburden the mind of its diſtreſs. This obſervation is finely illuſtrated by a ſtory which Herodotus records, *b.* 3. Cambyſes, when he conquered Egypt, made Pſammenitus the king priſoner; and for trying his conſtancy, ordered his daughter to be dreſſed in the habit of a ſlave, and to be employ'd in bringing water from the river; his ſon alſo was led to execution with a halter about his neck. The Egyptians vented their ſorrow in tears and lamentations: Pſammenitus only, with a downcaſt eye, remained ſilent. Afterward meeting one of his companions, a man advanced in years, who, being plundered of all, was begging alms, he wept bitterly, calling him by his name. Cambyſes, ſtruck with wonder, demanded an anſwer to the following queſtion: "Pſammenitus, thy maſter Cambyſes is deſirous to know, why, after thou hadſt ſeen thy daughter ſo ignominioſly treated, and thy ſon led to execution, without exclaiming or weeping, thou ſhouldſt be ſo highly concerned for a poor man, no way related to thee?" Pſammenitus returned the following anſwer: "Son of Cyrus, the calamities of my family are too great to leave me the power of weeping; but the misfortunes of a companion, reduced in his old age to want of bread, is a fit ſubject for lamentation."

Surpriſe and terror are ſilent paſſions, for a different reaſon: they agitate the mind ſo violently, as for a time to ſuſpend the exerciſe of its faculties, and among others the faculty of ſpeech.

Love and revenge, when immoderate, are not more loquacious than immoderate grief. But when theſe paſſions become moderate, they ſet the tongue free, and, like moderate grief, become loquacious. Moderate love, when unſucceſsful, is vented in complaints; when ſucceſsful, is full of joy expreſſed by words and geſtures.

As no paſſion hath any long uninterrupted exiſtence, nor beats always with an equal pulſe, the language ſuggeſted by paſſion is not only unequal but frequently interrupted: and even during an uninterrupted fit of paſſion, we only expreſs in words the more capital ſentiments. In familiar converſation, one who vents every ſingle thought, is juſtly branded with the character of *loquacity;* becauſe ſenſible people expreſs no thoughts but what make ſome figure: in the ſame manner, we are only diſpoſed to expreſs the ſtrongeſt impulſes of paſſion, eſpecially when it returns with impetuoſity after interruption.

It is elſewhere obſerved *, that the ſentiments ought to be tuned to the paſſion, and the language to both. Elevated ſentiments require elevated language: tender ſentiments ought to be clothed in words that are ſoft and flowing: when the mind is depreſſed with any paſſion, the ſentiments muſt be expreſſed in words that are humble, not low. Words being intimately connected with the ideas they repreſent, the greateſt harmony is required between them: to expreſs, for example, an humble ſentiment in high-ſounding words, is diſagreeable by a diſcordant mixture of feelings; and the diſcord is not leſs when elevated ſentiments are dreſſed in low words:

> Verſibus exponi tragicis res comica non vult.
> Indignatur item privatis ac prope ſocco
> Dignis carminibus narrari cœna Thyeſtæ.
>
> *Horat. Ars poet. l.* 89.

This, however, excludes not figurative expreſſion, which, within moderate bounds, communicates to the ſentiment an agreeable elevation. We are ſenſible of an effect directly oppoſite, where figurative expreſſion is indulged beyond a juſt meaſure: the oppoſition between the expreſſion and the ſentiment makes the diſcord appear greater than it is in reality.

At the ſame time, figures are not equally the language of every paſſion: pleaſant emotions, which elevate or ſwell the mind, vent themſelves in ſtrong epithets and figurative expreſſion; but humbling and diſpiriting paſſions affect to ſpeak plain:

> Et tragicus plerumque dolet ſermone pedeſtri
> Telephus et Peleus: cum pauper et exul uterque;
> Projicit ampullas et ſeſquipedalia verba,
> Si curat cor ſpectantis tetigeſſe querela.
>
> *Horat. Ars poet.* 95.

Figurative expreſſion, being the work of an enlivened imagination, cannot be the language of anguiſh or diſtreſs. Otway, ſenſible of this, has painted a ſcene of diſtreſs in colours finely adapted to the ſubject: there is ſcarce a figure in it, except a ſhort and natural ſimile with which the ſpeech is introduced. Belvidera talking to her father of her huſband:

Think you ſaw what paſt at our laſt parting;
Think you beheld him like a raging lion,
Pacing the earth, and tearing up his ſteps,
Fate in his eyes, and roaring with the pain
Of burning fury; think you ſaw his one hand
Fix'd on my throat, while the extended other
Graſp'd a keen threat'ning dagger: oh, 'twas thus
We laſt embrac'd, when, trembling with revenge,
He dragg'd me to the ground, and at my boſom
Preſented horrid death; cry'd out, My friends!

---

* See the article *Sentiments*.

Where are my friends? ſwore, wept, rag'd, threaten'd,
For he yet lov'd, and that dear love preſerv'd me [lov'd;
To this laſt trial of a father's pity.
I fear not death, but cannot bear a thought
That that dear hand ſhould do th' unfriendly office.
If I was ever then your care, now hear me;
Fly to the ſenate, ſave the promis'd lives
Of his dear friends, ere mine be made the ſacrifice.
Venice preſerv'd, act 5.

To preſerve the foreſaid reſemblance between words and their meaning, the ſentiments of active and hurrying paſſions ought to be dreſſed in words where ſyllables prevail that are pronounced ſhort or faſt; for theſe make an impreſſion of hurry and precipitation. Emotions, on the other hand, that reſt upon their objects, are beſt expreſſed by words where ſyllables prevail that are pronounced long or ſlow. A perſon affected with melancholy, has a languid and ſlow train of perceptions. The expreſſion beſt ſuited to that ſtate of mind, is where words, not only of long, but of many ſyllables, abound in the compoſition; and for that reaſon, nothing can be finer than the following paſſage:

In thoſe deep ſolitudes, and awful cells,
Where heav'nly-penſive Contemplation dwells,
And ever-muſing Melancholy reigns.
Pope, *Eloiſa to Abelard.*

To preſerve the ſame reſemblance, another circumſtance is requiſite, that the language, like the emotion, be rough or ſmooth, broken or uniform. Calm and ſweet emotions are beſt expreſſed by words that glide ſoftly: ſurpriſe, fear, and other turbulent paſſions, require an expreſſion both rough and broken.

It cannot have eſcaped any diligent inquirer into nature, that in the hurry of paſſion, one generally expreſſes that thing firſt which is moſt at heart; which is beautifully done in the following paſſage.

Me, me; adſum qui feci: in me convertite ferrum,
O Rutuli, mea fraus omnis. *Æneid.* ix. 427.

Paſſion has often the effect of redoubling words, the better to make them expreſs the ſtrong conception of the mind. This is finely imitated in the following examples.

——————— Thou ſun, ſaid I, fair light!
And thou enlighten'd earth, ſo freſh and gay!
Ye hills and dales, ye rivers, woods, and plains!
And ye that live, and move, fair creatures! tell,
Tell, if ye ſaw, how came I thus, how here.—
Paradiſe Loſt, b. viii. 273.

——————— Both have ſinn'd! but thou
Againſt God only; I, 'gainſt God and thee:
And to the place of judgment will return;
There with my cries importune Heaven, that all
The ſentence, from thy head remov'd, may light
On me, ſole cauſe to thee of all this wo;
Me! me! only juſt object of his ire.
Paradiſe Loſt, b. x. 930.

1. In general, the language of violent paſſion ought to be broken and interrupted. Soliloquies ought to be ſo in a peculiar manner: language is intended by nature for ſociety; and a man when alone, though he always clothes his thoughts in words, ſeldom gives his words utterance, unleſs when prompted by ſome ſtrong emotion; and even then by ſtarts and intervals only. Shakeſpeare's ſoliloquies may be juſtly eſtabliſhed as a model; for it is not eaſy to conceive any model more perfect. Of his many incomparable ſoliloquies, the two following only ſhall be quoted, being different in their manner.

Hamlet. Oh, that this too, too ſolid fleſh would
Thaw, and reſolve itſelf into a dew! [melt,
Or that the Everlaſting had not fix'd
His canon 'gainſt ſelf-ſlaughter! O God! O God!
How weary, ſtale, flat, and unprofitable
Seem to me all the uſes of this world!
Fie on't! O fie! 'tis an unweeded garden,
That grows to ſeed: things rank and groſs in nature
Poſſeſs it merely.——That it ſhould come to this!
But two months dead! nay, not ſo much; not two—
So excellent a king, that was, to this,
Hyperion to a ſatyr: ſo loving to my mother,
That he permitted not the winds of heav'n
Viſit her face too roughly. Heav'n and earth!
Muſt I remember—why, ſhe would hang on him,
As if increaſe of appetite had grown
By what it fed on: yet, within a month——
Let me not think—Frailty, thy name is *Woman!*
A little month! or ere thoſe ſhoes were old,
With which ſhe follow'd my poor father's body,
Like Niobe, all tears———why ſhe, ev'n ſhe——
(O heav'n! a beaſt, that wants diſcourſe of reaſon,
Would have mourn'd longer—) married with mine
uncle,
My father's brother; but no more like my father,
Than I to Hercules. Within a month!——
Ere yet the ſalt of moſt unrighteous tears
Had left the fluſhing in her galled eyes,
She married———Oh, moſt wicked ſpeed, to poſt
With ſuch dexterity to inceſtuous ſheets!
It is not, nor it cannot come to good.
But break, my heart, for I muſt hold my tongue
Hamlet, act 1. *ſc.* 3.

" *Ford.* Hum! ha! is this a viſion? is this a dream? do I ſleep? Mr Ford, awake; awake, Mr Ford; there's a hole made in your beſt coat, Mr Ford! this 'tis to be married! this 'tis to have linen and buck baſkets? Well, I will proclaim myſelf what I am; I will now take the leacher; he is at my houſe; he cannot 'ſcape me; 'tis impoſſible he ſhould; he cannot creep into a half-penny purſe, nor into a pepper-box. But leſt the devil that guides him ſhould aid him, I will ſearch impoſſible places; tho' what I am I cannot avoid, yet to be what I would not, ſhall not make me tame."
Merry Wives of Windſor, act 3. *ſc. laſt.*

Theſe ſoliloquies are accurate and bold copies of nature: in a paſſionate ſoliloquy one begins with thinking aloud; and the ſtrongeſt feelings only, are expreſſed; as the ſpeaker warms, he begins to imagine one liſtening, and gradually ſlides into a connected diſcourſe.

How far diſtant are ſoliloquies generally from theſe models? So far indeed as to give diſguſt inſtead of pleaſure. The firſt ſcene of Iphigenia in Tauris diſcovers that princeſs, in a ſoliloquy, gravely reporting to herſelf her own hiſtory. There is the ſame impropriety in the firſt ſcene of Alceſtes, and in the other introductions of Euripides, almoſt without exception. Nothing can be more ridiculous: it puts one in mind of a moſt curious device in Gothic paintings, that of making every figure explain itſelf by a written label iſſuing from its mouth. The deſcription which a paraſite, in the eunuch of Terence (*act* 2. *ſc.* 2.) gives of himſelf, makes a ſprightly ſoliloquy: but it is not conſiſtent with the rules of propriety; for no man, in his ordinary ſtate of mind and upon a familiar ſubject, ever thinks of talking aloud to himſelf. The ſame objection lies againſt a ſoliloquy in the Adelphi of the ſame author, (*act* 1. *ſc.* 1.) The ſoliloquy which makes the third ſcene act third of his *Heicyra*, is inſufferable; for there Pamphilus, ſoberly and circumſtantially, relates to himſelf an adventure which had happened to him a moment before.

Corneille is unhappy in his ſoliloquies: Take for a ſpecimen the firſt ſcene of Cinna.

Racine is extremely faulty in the ſame reſpect. His ſoliloquies are regular harangues, a chain completed in every link, without interruption or interval: that of Antiochus in Berenice (*act* 1. *ſc.* 2.) reſembles a regular pleading, where the parties *pro* and *con* diſplay their arguments at full length. The following ſoliloquies are equally faulty: *Bajazet*, *act* 3. *ſc.* 7; *Mithridate*, *act*. 3. *ſc.* 4. and *act*. 4. *ſc.* 5.; *Iphigenia*, *act*. 4. *ſc.* 8.

Soliloquies upon lively or intereſting ſubjects, but without any turbulence of paſſion, may be carried on in a continued chain of thought. If, for example, the nature and ſprightlineſs of the ſubject prompt a man to ſpeak his thoughts in the form of a dialogue, the expreſſion muſt be carried on without break or interruption, as in a dialogue between two perſons; which juſtifies Falſtaff's ſoliloquy upon honour:

> “ What need I be ſo forward with Death, that calls not on me? Well, 'tis no matter, Honour pricks me on. But how if Honour prick me off, when I come on? how then? Can Honour ſet a leg? No. Or an arm? No. Or take away the grief of a wound! No. Honour hath no ſkill in ſurgery then? No. What is Honour? A word.—What is that word *honour*” Air; a trim reckoning.—Who hath it? He that dy'd a Wedneſday. Doth he feel it? No. Doth he hear it? No. Is it inſenſible then? Yea, to the dead. But will it not live with the living? No. Why? Detraction will not ſuffer it. Therefore I'll none of it; honour is a mere ſcutcheon: and ſo ends my catechiſm.

Firſt Part, Henry IV. act 5. *ſc.* 2.

And even without dialogue, a continued diſcourſe may be juſtified, where a man reaſons in a ſoliloquy upon an important ſubject; for if in ſuch a caſe it be at all excuſeable to think aloud, it is neceſſary that the reaſoning be carried on in a chain; which juſtifies that admirable ſoliloquy in *Hamlet* upon life and immortality, being a ſerene meditation upon the moſt intereſting of all ſubjects. And the ſame conſideration will juſtify the ſoliloquy that introduces the 5th act of Addiſon's *Cato*.

2. Language ought not to be elevated above the tone of the ſentiment.

Zara. Swift as occaſion, I
Myſelf will fly; and earlier than the morn
Wake thee to freedom. Now 'tis late; and yet
Some news few minutes paſt arriv'd, which ſeem'd
To ſhake the temper of the king——Who knows
What racking cares diſeaſe a monarch's bed?
Or love, that late at night ſtill lights his lamp,
And ſtrikes his rays through duſk, and folded lids,
Forbidding reſt, may ſtretch his eyes awake,
And force their balls abroad at this dead hour.
I'll try. *Mourning Bride, act* 3. *ſc.* 4.

The language here is undoubtedly too pompous and laboured for deſcribing ſo ſimple a circumſtance as abſence of ſleep. In the following paſſage, the tone of the language, warm and plaintive, is well ſuited to the paſſion, which is recent grief: but every one will be ſenſible, that in the laſt couplet ſave one the tone is changed, and the mind ſuddenly elevated to be let fall as ſuddenly in the laſt couplet:

Il déteſte à jamais ſa coupable victoire,
Il renonce à la cour, aux humains, à la gloire;
Et ſe fuïant lui-même, au milieu des deſerts,
Il va cacher ſa peine au bout de l'univers;
Là, ſoit que le ſoleil rendît le jour au monde,
Soit qu'il finît ſa courſe au vaſte ſeine de l'onde,
Sa voix faiſoit redire aux echos attendris,
Le nom, le triſte nom, de ſon malheureux fils.
Henriade, chant. viii. 229.

3. Light and airy language is unſuitable to a ſevere paſſion.

Imagery and figurative expreſſion are diſcordant, in the higheſt degree, with the agony of a mother, who is deprived of two hopeful ſons by a brutal murder. Therefore the following paſſage is undoubtedly in a bad taſte:

Queen. Ah, my poor princes! ah, my tender babes!
My unblown flowers, new appearing ſweets!
If yet your gentle ſouls fly in the air,
And be not fixt in doom perpetual,
Hover about me with your airy wings,
And hear your mother's lamentation.
Richard III. *act* 4. *ſc.* 4.

Again,

K. Philip. You are as fond of grief as of your child.
Conſtance. Grief fills the room up of my abſent child,
Lies in his bed, walks up and down with me,
Puts on his pretty looks, repeats his words,
Remembers me of all his gracious parts,
Stuffs out his vacant garment with his form;
Then have I reaſon to be fond of grief.
King John, act 3. *ſc.* 9.

4. Thoughts that turn upon the expreſſion inſtead of the ſubject, commonly called *a play of words*, being low and childiſh, are unworthy of any compoſition, whether gay or ſerious, that pretends to any degree of elevation.

In the *Amynta* of Taſſo, the lover falls into a mere play of words, demanding how he who had loſt himſelf, could find a miſtreſs. And for the ſame reaſon, the following paſſage in Corneille has been generally condemned:

Chimene. Mon pere eſt mort, Elvire, et la premiere épée
Dont s'eſt armée Rodrigue a ſa trame coupée.

Pleurez, pleurez, mes yeux, et fondez-vous en eau,
La moietié de ma vie a mis l'autre au tombeau,
Et m'oblige à venger, après ce coup funeſte,
Celle que je n'ai plus, ſur celle que me reſte.
Cid, act 3. *ſc.* 3.

To die is to be baniſh'd from myſelf:
And Sylvia is myſelf: baniſh'd from her,
Is ſelf from ſelf; a deadly baniſhment?
Two Gentlemen of Verona, act 3. *ſc.* 3.

Counteſs. I pray thee, Lady, have a better cheer:
If thou engroſſeſt all the griefs as thine,
Thou robb'ſt me of a moiety.
All's well that ends well, act 3. *ſc.* 3.

K. Henry. O my poor kingdom, ſick with civil blows!
When that my care could not with-hold thy riots,
What wilt thou do when riot is thy care?
O, thou wilt be a wilderneſs again,
Peopled with wolves, thy old inhabitants.
Second Part, Henry IV. act 4. *ſc.* 11.

Cruda Amarilli, che col nome ancora
D'amar, ahi laſſo, amaramente inſegni.
Paſtor Fido, act 1. *ſc.* 2.

Antony, ſpeaking of Julius Cæſar:

O world! thou waſt the foreſt of this hart;
And this, indeed, O world, the heart of thee.
How like a deer, ſtriken by many princes,
Doſt thou here lie! *Julius Cæſar, act* 3. *ſc.* 3.

Playing thus with the ſound of words, which is ſtill worſe than a pun, is the meaneſt of all conceits. But Shakeſpeare, when he deſcends to a play of words, is not always in the wrong; for it is done ſometimes to denote a peculiar character, as in the following paſſage:

K. Philip. What ſay'ſt thou, boy? look in the lady's face.
Lewis. I do, my Lord, and in her eye I find
A wonder, or a wond'rous miracle;
The ſhadow of myſelf form'd in her eye;
Which being but the ſhadow of your ſon,
Becomes a ſun, and makes your ſon a ſhadow.
I do proteſt, I never lov'd myſelf
Till now infixed I beheld myſelf
Drawn in the flatt'ring table of her eye.
Faulconbridge. Drawn in the flatt'ring table of her eye!
Hang'd in the frowning wrinkle of her brow!
And quarter'd in her heart! he doth eſpy
Himſelf Love's traitor: this is pity now,
That hang'd, and drawn, and quarter'd, there ſhould be,
In ſuch a love ſo vile a lout as he.
King John, act 2. *ſc.* 5.

A jingle of words is the loweſt ſpecies of that low wit; which is ſcarce ſufferable in any caſe, and leaſt of all in an heroic poem: and yet Milton in ſome inſtances has deſcended to that puerility:

And brought into the world a world of wo.
——Begirt th'Almighty throne
Beſeeching or beſieging———
Which tempted our attempt———
At one ſlight bound high overleap'd all bound.

——————— With a ſhout
Loud as from numbers without number.

5. One ſhould think it unneceſſary to enter a caveat againſt an expreſſion that has no meaning, or no diſtinct meaning; and yet ſomewhat of that kind may be found even among good writers.

Sebaſtian. I beg no pity for this mould'ring clay.
For if you give it burial, there it takes
Poſſeſſion of your earth:
If burnt and ſcatter'd in the air; the winds
That ſtrow my duſt, diffuſe my royalty,
And ſpread me o'er your clime; for where one atom
Of mine ſhall light, know there Sebaſtian reigns.
Dryden, *Don Sebaſtian king of Portugal, act* 1.

Cleopatra. Now, what news, my Charmion?
Will he be kind? and will he not forſake me?
Am I to live or die? nay, do I live?
Or am I dead? for when he gave his anſwer,
Fate took the word, and then I liv'd or dy'd.
Dryden, *All for love, act* 2.

If ſhe be coy, and ſcorn my noble fire,
If her chill heart I cannot move;
Why, I'll enjoy the very love,
And make a miſtreſs of my own deſire.
Coweey, *poem inſcribed,* "The Requeſt."

His whole poem, inſcribed, *My picture*, is a jargon of the ſame kind.

——————'Tis he, they cry, by whom
Not men, but war itſelf is overcome.
Indian Queen.

Such empty expreſſions are finely ridiculed in the *Rehearſal.*

Was't not unjuſt to raviſh hence her breath,
And in life's ſtead to leave us nought but death?
Act 4. *ſc.* 1.

Passions, *in Medicine*, make one of the non-naturals, and produce very ſenſible effects. Joy, anger, and fear, are the principal. In the two firſt, the ſpirits are hurried with too great vivacity; whereas, in fear or dread, they are as it were curbed and concentrated: whence we may conclude, that they have a very bad effect upon health; and therefore it will be beſt to keep them within bounds as much as poſſible, and to preſerve an inward ſerenity, calmneſs, and tranquillity.

Passions, *in Painting*, are the external expreſſions of the different diſpoſitions and affections of the mind; but particularly their different effects upon the ſeveral features of the face: for though the arms, and indeed every part of the body *, ſerve likewiſe, by their quick, languid, and variouſly diverſified motions, to expreſs the paſſions of the ſoul; yet, in painting, this difference is moſt conſpicuous in the face. See Painting, nº 15. and Drawing, art. 9.

In ſorrow, joy, love, ſhame, and compaſſion, the eyes ſwell all of a ſudden, are covered with a ſuperabundant moiſture, and drop tears; and, in grief eſpecially, the corners of the mouth hang down, the eyelids are half ſhut, and the pupil of the eye is elevated and half covered; and all the other muſcles of the face are relaxed, ſo that the viſage appears longer than ordinary.

* See *Oratory*, nº 25 36.

In fear, terror, fright, and horror, the eye-brows are greatly elevated: the eye-lids are expanded as wide as poſſible, ſo as to diſcover the white of the eye; and the pupil is depreſſed, and half covered by the lower eye-lid: the hair ſtands on end: the mouth is at the ſame time wide open; and the lips are ſo far drawn back, that the teeth both of the upper and under jaw appear.

Contempt is expreſſed by raiſing one ſide of the upper lip, ſo as to diſcover the teeth, whilſt the other ſide has a movement like that in laughter; the eye, on that ſide where the teeth appear, is half ſhut, whilſt the other remains open; however, both the pupils are depreſſed.

In jealouſy, envy, hatred, and malice, the eye-brows are knit; and, in laughter, all the parts agree, tending as it were towards the centre of the face. See Plates XC. XCVIII.

Passion-*Flower*. See Passiflora.

Passion-*Week*, the week immediately preceding the feſtival of Eaſter: ſo called, becauſe in that week our Saviour's paſſion and death happened. The Thurſday of this week is called *Maunday Thurſday;* the Friday, *Good Friday;* and the Saturday, the *Great Sabbath*.

PASSIVE, in general, denotes ſomething that ſuffers the action of another, called an *agent* or *active power*. In grammar, the verb or word that expreſſes this paſſion is termed a *paſſive verb:* which, in the learned languages, has a peculiar termination; as *amor*, *doceor*, &c. in Latin; that is, an *r* is added to the actives *amo*, *doceo:* and, in the Greek, the inflection is made by changing ω into ομαι; as τυπτω τυπτομαι, &c. But, in the modern languages, the paſſive inflection is performed by means of auxiliary verbs, joined to the participle paſſive; as, "I am praiſed," in Latin *laudor*, and in Greek επαινεομαι; or, "I am loved," in Latin *amor*, and in Greek φιλεομαι. Thus it appears, that the auxiliary verb *I am*, ſerves to form the paſſives of Engliſh verbs: and the ſame holds of the French; as, *Je ſuis loué*, "I am praiſed;" *j'ai eté louè*, "I have been praiſed," &c.

Passive *Title*, in Scots law. See Law, Part III. N° clxxx. 30.

PASSOVER, a ſolemn feſtival of the Jews, celebrated on the 14th day of the month next after the vernal equinox, and inſtituted in commemoration of their coming out of Egypt; becauſe, on the night before their departure, the deſtroying angel, who put to death the firſt-born of the Egyptians, paſſed over the houſes of the Hebrews, which were ſprinkled with the blood of a lamb. The whole tranſaction is related in the xiith chapter of Exodus.

PASSPORT, or Pass, a licence or writing obtained from a prince or governor, granting permiſſion and a ſafe-conduct to paſs through his territories without moleſtation. Alſo a permiſſion granted by any ſtate to navigate in ſome particular ſea, without hindrance or moleſtation from it. It contains the name of the veſſel, and that of the maſter, together with her tonnage and the number of her crew, certifying that ſhe belongs to the ſubjects of a particular ſtate, and requiring all perſons at peace with that ſtate to ſuffer her to proceed on her voyage without interruption.

PASTEBOARD, a kind of thick paper, formed of ſeveral ſingle ſheets paſted one upon another. The chief uſe of paſteboard is for binding books, making letter-caſes, &c.

PASTERN *of a* Horse, in the menage, is the diſtance betwixt the joint next the foot and the coronet of the hoof. This part ſhould be ſhort, eſpecially in middle-ſized horſes; becauſe long paſterns are weak, and cannot ſo well endure travelling.

Pastern-*Joint*, the joint next a horſe's foot.

PASTIL, or Pastel, among painters, a kind of paſte made of different colours, ground up with gum-water, in order to make Crayons.

Pastil, in pharmacy, is a dry compoſition of ſweet-ſmelling reſins, aromatic woods, &c. ſometimes burnt to clear and ſcent the air of a chamber.

PASTINACA, the Parsnep, in botany, a genus of the digynia order, belonging to the pentandria claſs of plants. There are only two ſpecies of this genus; the principal of which is the *paſtinaca ſativa*, or garden-parſnep: which is an exceeding fine eſculent root. It is to be propagated by ſowing the ſeeds in February or March, in a rich mellow ſoil, which muſt be deep dug, that the roots may be able to run deep without hindrance.

It is a common practice to ſow carrots at the ſame time, upon the ſame ground with the parſneps; and if the carrots are deſigned to be drawn young, there is no harm in it. The parſneps, when they are grown up a little, muſt be thinned to a foot diſtance, and carefully kept clear of weeds. They are fineſt taſted juſt at the ſeaſon when the leaves are decayed; and ſuch as are deſirous to eat them in ſpring ſhould have them taken up in autumn, and preſerved in ſand. When the ſeeds are to be ſaved, ſome very ſtrong and fine plants ſhould be left four feet diſtance; and towards the end of Auguſt, or in the beginning of September, the ſeeds will be ripe: they muſt then be carefully gathered, and dried on a coarſe cloth. They ſhould always be ſown the ſpring following; for they do not keep well.

PASTORAL, in general, ſomething that relates to ſhepherds; hence we ſay, paſtoral life, manners, poetry, &c.

Pastoral *Poetry*. See Poetry, n° 63.

PASTRY, that branch of cookery which is chiefly taken up in making pies, paſties, cakes, &c.

Dr Cullen obſerves, that paſte is very hard and indigeſtible without butter; and, even with it, is apt to produce heart-burn and aceſcency. Perhaps this is increaſed by the burned butter, from a certain ſenſibility in the ſtomach, which occaſions all empyreumatic oils to be long retained, and ſo turn ranceſcent and acid.

PASTURE, or Pasture-*Land*, is that reſerved for feeding cattle.

Paſture-land is of ſuch advantage to huſbandry, that many prefer it even to corn-land, becauſe of the ſmall hazard and labour that attends it; and as it lays the foundation for moſt of the profit that is expected from the arable land, becauſe of the manure afforded by the cattle which are fed upon it. Where dung is not to be bought, as is often the caſe in places diſtant from large towns, the farmer is forced to proportion the arable to the paſture land, in ſuch a manner, that the cattle fed on the latter may be ſufficient for a ſupply of dung ſo neceſſary for producing the fruits of the former.

PATAGONIA, a country of South America, comprehending all that country extending from Chili and Paraguay to the utmoſt extremity of South America; that is, from 35° almoſt to 54° of latitude: being ſurrounded by the countries juſt mentioned, the South and North Seas, and the Straits of Magellan, which ſeparate it from the iſland called *Terra del Fuego*, and extend about 116 leagues in length from ſea to ſea, but only from half a league to three or four in breadth.

This country had the name of *Terra Magellanica*, from Ferdinand Magellan, a Portugueſe officer in the ſervice of the Catholic king, who is reported to have ſailed through the ſtraits that alſo bear his name, from the North to the South Sea, in the year 1510.

The lofty mountains of the Andes, which are covered with ſnow a great part of the year, traverſing the country from north to ſouth, the air is ſaid to be much colder than in the north under the ſame parallels of latitude. Towards the north, it is ſaid to be covered with wood, and ſtored with an inexhauſtible fund of large timber; whereas, to the ſouthward, not ſo much as a ſingle tree fit for any mechanical purpoſe is to be ſeen: yet there is good paſture, and incredible numbers of wild horned cattle and horſes, which were firſt brought hither by the Spaniards, and have increaſed amazingly. Freſh water, we are told by ſome writers, is very ſcarce; but if that were really the caſe, it is difficult to conceive how the preſent inhabitants, and ſuch multitudes of cattle, could ſubſiſt. The eaſt coaſt is moſtly low land, with few or no good harbours: one of the beſt is Port St Julian.

Patagonia is inhabited by a variety of Indian tribes; as the Patagons, from which the country takes its name; the Pampas, the Coſſares, &c. of whom we know very little. Only it appears, from the accounts of former voyagers, lately confirmed by commodore Byron and his crew, and the teſtimonies of other navigators, that ſome of them are of a gigantic ſtature, and clothed with ſkins; but it would ſeem that there are others who go almoſt quite naked, notwithſtanding the inclemency of the climate. Some of them alſo, that live about the Straits, if we may credit the navigators who have paſſed that way into the South Sea, are perfect ſavages: but thoſe with whom commodore Byron and his people converſed, are repreſented as of a more gentle humane diſpoſition; only, like other ſavages, they live on fiſh and game, and what the earth produces ſpontaneouſly.

The Spaniards once built a fort upon the Straits, and left a garriſon in it, to prevent any other European nation paſſing that way into the South Sea: but moſt of the men periſhed by famine, whence the place obtained the name of *Port Famine;* and no people have attempted to plant colonies here ever ſince.

About the middle of the Strait is a promontory called *Cape Froiſard*, which is the moſt ſoutherly on the continent of South America.

On the coaſts of Patagonia lie a great number of iſlands, or cluſters of iſlands. On the weſt coaſt are the iſlands Madre de Dios, Santa Trinidad, Santa Cruz, the iſles of the Chunians and Huillans, the Sarmientos, and many others; to the number of 80 in all, as ſome ſay. Of thoſe on the ſouth coaſt, the moſt conſiderable are *Terra del Fuego*, and *Staten Land*. See theſe articles.

PATAN, a kingdom of Aſia, in the Eaſt Indies, and in the peninſula of Malacca, and on the eaſtern coaſt between the kingdoms of Siam and Paha. The inhabitants are partly Mahometans and partly Gentoos; but they are all very voluptuous. The air is wholeſome, though very hot; and they have no ſeaſons but the winter and ſummer. The former is more properly the rainy ſeaſon; and contains the months of November, December, and January. The woods are full of elephants and many wild animals. Some voyagers pretend that this country is governed by a queen, who never marries, but may have as many gallants as ſhe pleaſes. They have ſome trade with the Chineſe; and the principal town is of the ſame name, which is one of the ſtrongeſt in theſe parts, having a well defended habour.

PATAN, a town of Aſia, and capital of a province of the ſame name, in the dominions of the Great Mogul; it is very little known. E. Long. 109. 0. N. Lat. 27. 30.

PATAVINITY, among critics, denotes a peculiarity of Livy's diction; derived from Patavium or Padua, the place of his nativity: but wherein this patavinity conſiſts, they are by no means agreed.

PATARA, (Livy, Mela); the capital of Lycia, to the eaſt of the mouth of the river Xanthus; famous for a temple and oracle of Apollo, thence called *Patareus*, three ſyllables only; but *Pataræus*, (Horace). For the ſix winter months, Apollo gave anſwers at Patara; and for the ſix ſummer at Delos, (Virgil, Servius): theſe are the *Lyciæ Sortes* of Virgil. The town was ſituated in a peninſula, called *Lyciorum Cherſoneſus*, (Stephanus).

PATAVIUM, (Tacitus, Strabo); a town of the Tranſpadana, ſituate on the left or north bank of the Medoacus Minor; founded by Antenor the Trojan, (Mela, Virgil, Seneca); *Patavini*, the people, (Livy); who himſelf was a native, and by Aſinius Pollio charged with pativinity. Now *Padua*, in the territory and to the weſt of Venice. E. Long. 12. 15. N. Lat. 45. 30.

PATAY, a town of France, in the province of Orleannois, remarkable for the defeat of the Engliſh in 1429, and where Joan of Arc did wonders. E. Long. 1. 43. N. Lat. 48. 5.

PATE, in fortification, a kind of platform, reſembling what is called an *horſe's ſhoe*.

PATEE, or PATTEE, in heraldry, a croſs ſmall in the centre, and widening to the extremes, which are very broad.

PATELLA, or KNEE-PAN, in anatomy. See there, n° 58.

PATELLA, the *Limpet*, a genus of inſects belonging to the order of vermes teſtacea. It is an animal of the ſnail kind; the ſhell conſiſts of one conical valve without any ſpiral. There are 36 ſpecies; principally diſtinguiſhed by peculiarities in their ſhells.

PATENT, in general, denotes ſomething that ſtand open or expanded: thus a leaf is ſaid to be patent, when it ſtands almoſt at right angles with the ſtalk.

PATENT, or *Letters Patent*. See LETTER.

PATER noster, the *Lord's Prayer*, ſo called from the two firſt words thereof in Latin.

PATER *Noſter*, iſlands of Aſia, in the Eaſt Indian ſea, ſo called becauſe of the great number of rocks, which ſailors have likened to the beads with which the Papiſts tell their pater-noſter. They abound in corn and fruits, and are very populous.

PATER patratus, in Roman antiquity, an officer choſen by one of the college of feciales out of their own body, to treat with an enemy on the ſubject of war and peace. He derived his title from a circumſtance neceſſary to his enjoying it: for in order that he might be the more firmly intereſted in the fate of his country, he was to have both a father and a ſon living at the ſame time.

PATERA, among antiquaries, a goblet or veſſel uſed by the Romans in their ſacrifices; wherein they offered their conſecrated meats to the gods, and wherewith they made libations. See SACRIFICE and LIBATION.

The word is Latin, formed from *pateo*, "I am open;" *quòd pateat*, "becauſe it has a great aperture;" in contradiſtinction to bottles, &c. which have only narrow necks, or whoſe aperture is leſs than the body of the veſſel.

On medals the patera is ſeen in the hands of ſeveral deities; and frequently in the hands of princes, to mark the ſacerdotal authority joined with the imperial, &c.

Hence F. Joubert obſerves, that beſide the patera, there is frequently an altar upon which the patera ſeems to be pouring its contents.

The patera was of gold, ſilver, marble, braſs, glaſs, or earth; and they uſed to incloſe it in urns with the aſhes of the deceaſed, after it had ſerved for the libations of the wine and liquors at the funeral.

The patera is an ornament in architecture, frequently ſeen in the Doric freeze, and the tympans of arches.

PATERCULUS (Caius Velleius), an ancient Roman hiſtorian, who flouriſhed in the reign of Tiberius Cæſar, was born in the year of Rome 735. His anceſtors were illuſtrious for their merit and their offices. His grandfather eſpouſed the party of Tiberius Nero, the emperor's father; but being old and infirm, and not able to accompany Nero when he retired from Naples, he ran himſelf through with his ſword. His father was a ſoldier of rank, and ſo was Paterculus himſelf. He was a military tribune when Caius Cæſar, a grandſon of Auguſtus, had an interview with the king of the Parthians, in an iſland of the river Euphrates, in the year 753. He commanded the cavalry in Germany under Tiberius; and accompanied that prince for nine years ſucceſſively in all his expeditions. He received honourable rewards from him; but we do not find that he was preferred to any higher dignity than the prætorſhip. The praiſes he beſtows upon Sejanus give ſome probability to the conjecture, that he was looked upon as a friend of this favourite, and conſequently that he was involved in his ruin. His death is placed by Mr Dodwell in the year of Rome 784, when he was in his 50th year.

He wrote an abridgment of the Roman hiſtory in two books, which is very curious. His purpoſe was only to deduce things from the foundation of Rome to the time wherein he lived, but he began his work with things previous to that memorable æra: for, though the beginning of his firſt book is wanting, we yet find in what remains of it, an account of many cities more ancient than Rome. He promiſed a larger hiſtory; and no doubt would have executed it well: for during his military expeditions he had ſeen, as he tells us, the provinces of Thrace, Macedonia, Achaia, Aſia Minor, and other more eaſterly regions; eſpecially upon the ſhores of the Euxine ſea, which had furniſhed his mind with much entertaining and uſeful knowledge. In the Abridgment which we have, many particulars are related that are no where elſe to be found; and this makes it the more valuable. The ſtyle of Paterculus, though miſerably diſguiſed through the careleſſneſs of tranſcribers, and impoſſible to be reſtored to purity for want of manuſcripts, is yet manifeſtly worthy of his age, which was the time of pure Latinity. The greateſt excellence of this hiſtorian lies in his manner of commending and blaming thoſe he ſpeaks of; which he does in the fineſt terms and moſt delicate expreſſions. He is, however, condemned, and indeed with the greateſt reaſon, for his partiality to the houſe of Auguſtus; and for making the moſt extravagant eulogies, not only upon Tiberius, but even upon his favourite *Sejanus:* whom, though a vile and cruel monſter, Parterculus celebrates as one of the moſt excellent perſons the Roman commonwealth had produced. Lipſius, though he praiſes him in other reſpects, yet cenſures him moſt ſeverely for his inſincerity and partiality. "Velleius Paterculus (ſays he), raiſes my indignation: he repreſents Sejanus as endowed with all good qualities. The impudence of this hiſtorian! But we know, that he was born, and died, to the deſtruction of mankind. After many commendations, he concludes, that Livia was a woman more reſembling the gods than men: and as to Tiberius, he thinks it a crime to ſpeak otherwiſe of him than as of an immortal Jove. What ſincere and honeſt mind can bear this? On the other hand, how artfully does he every where conceal the great qualities of Cæſar Germanicus! how obliquely does he ruin the reputation of Agrippina and others, whom Tiberius was thought to hate! In ſhort, he is nothing but a court-proſtitute. You will ſay, perhaps, it was unſafe to ſpeak the truth at thoſe times: I grant it; but if he could not write the truth, he ought not to have written lies: none are called to account for ſilence." La Mothe le Vayer has made a very juſt remark upon this occaſion: "The ſame fault (ſays he) may be obſerved in many others, who have written the hiſtory of their own times, with a deſign to be publiſhed while they lived."

It is ſtrange, that a work ſo elegant and worthy to be preſerved, and of which, by reaſon of its ſhortneſs, copies might be ſo eaſily taken, ſhould have been ſo near being loſt. One manuſcript only has had the luck to be found, as well of this author among the Latins, as of Heſychius among the Greeks: in which, ſays a great critic of our own nation, "The faults of the ſcribes are found ſo numerous, and the defects ſo beyond all redreſs, that notwithſtanding the pains of the learned and moſt acute critics for two whole centuries, theſe books ſtill are, and are like to continue, a mere heap of errors." No ancient author but Priſcian makes mention of Paterculus: the moderns have done him infinitely more juſtice, and have illuſtrated him with notes and commentaries. He was firſt publiſhed, from the manuſcript of Morbac, by Rhenanus, at Baſil in 1520: afterwards by Lipſius at Leyden in 1581; then by Gerard Voſſius in 1639; next by Boeclerus at Straſburg in 1642; then by Thyſius and others; and, laſtly, by Peter Burman at Leyden 1719, in 8vo. To the Oxford edition in 1693, 8vo, were prefixed the *Annales Velleiani* of Mr Dodwell, which ſhew deep learning and a great knowledge of antiquity.

PATH, in general, denotes the courſe or track marked out or run over by a body in motion.

For the path of the moon, &c. ſee ASTRONOMY, n° 147, 155.

PATHETIC, whatever relates to the paſſions, or that is proper to excite or awake them. The word comes from the Greek παθος, *paſſion*, or *emotion*. See PASSION.

PATHOGNOMONIC, among phyſicians, an appellation for a ſymptom, or concourſe of ſymptoms that are inſeparable from a diſtemper, and are found in that only, and in no other.

PATHOLOGY, that part of medicine which explains the nature of diſeaſes, their cauſes and ſymptoms. See MEDICINE.

PATHOS, a Greek term, literally ſignifying paſſion.

PATIN (Guy), profeſſor of phyſic in the royal college of Paris, was born in 1602. He made his way into the world merely by the force of his genius, being at firſt corrector of a printing-houſe. He was a man of great wit and erudition: he ſpoke with the gravity of a Stoic, but his expreſſions were very ſatirical. He hated bigotry, ſuperſtition, and knavery; had an upright ſoul, and a well-diſpoſed heart. He was a moſt tender father, courteous to every body, and polite in the higheſt degree. He died in 1672, and did not owe his reputation to any writings publiſhed in his life-time upon phyſic; but his letters which appeared after his death have rendered his name very famous. He left a ſon mentioned in the enſuing article.

PATIN (Charles), who made a great figure in the world, and excelled in the knowledge of medals. He was born in Paris in 1633; and made ſo ſurpriſing a progreſs, that he maintained theſes in Greek and Latin, on all parts of philoſophy, in 1647. He ſtudied the law in compliance to an uncle, and was admitted an advocate in the parliament of Paris; but could not lay aſide that of phyſic; for which he always had an inclination. He therefore quitted the law, and devoted himſelf to phyſic; in which, after taking the doctor's degree, he applied himſelf to practice, with great ſucceſs. He afterwards travelled into Germany, Holland, England, Switzerland, and Italy. In 1676 he was appointed profeſſor of phyſic in Padua; and three years after was created a knight of St Mark. He died in that city in 1694. His works are many, and well known to the learned world. His wife too, and his daughters, were authoreſſes.

PATMOS (anc. geog.), one of the Sporades (Dionyſius); 30 miles in compaſs (Pliny); concerning which we read very little in authors. It was rendered famous by the exile of St John and the Revelation ſhewed him there. It is now in the hands of the Turks. It is conſiderable for its harbours; but the inhabitants derive little benefit from them, becauſe the corſairs have obliged them to quit the town and retire to a hill on which St John's convent ſtands. This convent is a citadel, conſiſting of ſeveral irregular towers, and is a ſubſtantial building ſeated on a very ſteep rock. The whole iſland is very barren, and without wood; however, it abounds with partridges, rabbits, quails, turtles, pigeons, and ſnipes. All their corn does not amount to 1000 barrels in a year. It is 18 miles in circumference; and there are ſcarce 300 men in it: but there are above 20 women to one man, who expect that all ſtrangers who land in the iſland ſhould carry ſome of them away. To the memory of St John, is an hermitage on the ſide of a mountain, where there is a chapel not above eight paces long and five broad. Over head they ſhew a chink in the rock, through which they pretend that the Holy Ghoſt dictated to St John. E. Long. 26. 40. N. Lat. 37. 20.

PATNA, a town of Aſia, in the dominions of the Great Mogul, and capital of a territory of the ſame name, to the north of the kingdom of Bengal, where the Engliſh have factories for ſaltpetre, borax, and raw-ſilk. It alſo produces large quantities of opium. The town is large, but the houſes are built at a diſtance from each other. It is ſeated in a fertile pleaſant country, 400 miles eaſt of Agra. E. Long. 85. 40. N. Lat. 25. 25.

PATANCE, in heraldry, is a croſs, flory at the ends; from which it differs only in this, that the ends, inſtead of turning down like a fleur de lis, are extended ſomewhat in the pattee form. See FLORY.

POTOMACK, a large river of North America, in Virginia, which riſes in the Alleghany mountains, ſeparates Virginia from Maryland, and falls into Cheſapeak bay. It is about ſeven miles broad, and is navigable for near 200 miles.

PATRANA, or PASTRANA, a town of New Caſtile in Spain, with the title of a duchy. It is ſeated between the rivers Tajo and Tajuna, in E. Lon. 0. 15.

PATRAS, an ancient and flouriſhing town of European Turky, in the Morea, capital of a duchy, with a Greek archbiſhop's ſee. It is pretty large and populous; and the Jews, who are one third part of the inhabitants, have four ſynagogues. There are ſeveral handſome moſques and Greek churches. The Jews carry on a great trade in ſilk, leather, honey, wax, and cheeſe. There are cypreſs trees of a prodigious height, and excellent pomegranates, citrons, and oranges. It has been ſeveral times taken and retaken, and it is juſt now in the hands of the Turks. It is ſeated in E. Long. 21. 57. N. Lat. 38. 20.

PATRICA, a town of Italy in the territory of the church, and in the Campagna of Rome, towards the ſea-coaſt, and eight miles eaſt of Oſtia. About a mile from this place is a hill called *Monte di Livano*, which ſome have thought to be the ancient Lavinium founded by Æneas.

PATRES CONSCRIPTI. See CONSCRIPT and SENATOR.

PATRIARCH, PATRIARCHA, one of thoſe firſt fathers who lived towards the beginning of the world, and who became famous by their long lines of deſcendants. Abraham, Iſaac, and Jacob, and his twelve ſons, are the patriarchs of the Old Teſtament; Seth, Enoch, &c. were antediluvian patriarchs.

PATRIARCHS, among Chriſtians, are eccleſiaſtical dignitaries, or biſhops, ſo called from their paternal authority in the church. The power of patriarchs was not the ſame in all, but differed according to the different cuſtoms of countries, or the pleaſures of kings and councils. Thus the patriarch of Conſtantinople grew to be a patriarch over the patriarchs of Epheſus and Cæſarea, and was called the *œcumenical and univerſal patriarch*; and the patriarch of Alexandria had ſome prerogatives which no other patriarch but himſelf enjoyed, ſuch as the right of conſecrating and approving every ſingle biſhop under his juriſdiction.

PATRIARCHAL CROSS, in heraldry, is that where the ſhaft is twice croſſed; the lower arms being longer than the upper ones.

PATRICIAN, among the ancient Romans, a title given to the deſcendents of the hundred, or, according to others, of the two hundred firſt ſenators choſen by Romulus, and by him called *patres*, "fathers."

PATRICK (St), the apoſtle of Ireland, and ſecond biſhop of that country in the 5th century. At 16 years of age he was made a ſlave, and continued ſo for ſix years. Then he became a diſciple of St Martine of Tours, who ordained him prieſt, and ſent him into Ireland, where he laboured ſucceſsfully for 60 years in converting the inhabitants.

PATRICK (Simon), a very learned Engliſh biſhop, was born at Gainſborough in Lincolnſhire in 1626. In 1644 he was admitted into Queen's college, Cambridge, and entered into holy orders. After being for ſome time chaplain to Sir Walter St John, and vicar of the church at Batterſea in Surry, he was preferred to the rectory of St Paul's, Covent-garden, in London, where he continued all the time of the plague in 1665 among his pariſhioners, to their great comfort. In 1668 he publiſhed his *Friendly Debate* between a Conformiſt and a Non-conformiſt. This was anſwered by the Diſſenters, whom he had much exaſperated by it; but by his moderation and candour toward them afterwards, they were perfectly reconciled to him, and he brought over many of them to the communion of the eſtabliſhed church. In 1678 he was made dean of Peterborough, where he was much beloved. In 1682, Dr Lewis de Moulin, who had been a hiſtory-profeſſor at Oxford, and written many bitter books againſt the church of England, ſent for Dr Patrick upon his ſick-bed, and made a ſolemn declaration of his regret on that account, which he ſigned, and it was publiſhed after his death. During the reign of king James, the dean's behaviour ſhewed that he had nothing more at heart than the Proteſtant religion; for which he ventured all that was dear to him, by preaching and writing againſt the errors of the church of Rome. In 1687 he publiſhed a prayer compoſed for that difficult time, when perſecution was expected by all who ſtood firm to their religion. The year after the Revolution, the dean was appointed biſhop of Chicheſter, and was employed with others of the new biſhops to ſettle the affairs of the church in Ireland. In 1691 he was tranſlated to the ſee of Ely, in the room of the deprived biſhop Turner. He died in 1707, after having publiſhed various works; among which the moſt diſtinguiſhed are his Paraphraſes and Commentaries on the holy ſcriptures, 3 volumes folio. Theſe, with Lowth on the proverbs, Arnold on the Apocrypha, and Whitby on the New Teſtament, make a regular continued commentary in Engliſh on all the ſacred books.

PATRIMONY, a right or eſtate inherited by a perſon from his anceſtors.

The term *patrimony* has been alſo given to church-eſtates or revenues; in which ſenſe authors ſtill ſay, the patrimony of the church of Rimini, Milan, &c. The church of Rome hath patrimonies in France, Africa, Sicily, and many other countries. To create the greater reſpect to the eſtates belonging to the church, it was uſual to give their patrimonies the names of the ſaints they held in the higheſt veneration: thus the eſtate of the church of Ravenna was called the *patrimony of St Apollinarius*; that of Milan, the *patrimony of St Ambroſe*; and the eſtates of the Roman church were called the *patrimoay of St Peter in Abruzzo*, the *patrimony of St Peter in Sicily*, and the like.

What is now called *St Peter's patrimony* is only the duchy of Caſtro, and the territory of Orvietto. See CASTRO, &c.

PATRIPASSIANS, PATRIPASSIANI, in church-hiſtory, a Chriſtian ſect, who appeared about the latter end of the 2d century; ſo called, from their aſcribing the paſſion to the Father: for they aſſerted the unity of God in ſuch a manner as to deſtroy all diſtinctions of perſons, and to make the Father and Son preciſely the ſame; in which they were followed by the Sabellians and others. The author and head of the Patripaſſians was Praxeas, a philoſopher of Phrygia in Aſia.

PATROL, in war, a round or march made by the guards or watch in the night-time, to obſerve what paſſes in the ſtreets, and to ſecure the peace and tranquillity of a city or camp. The patrol generally conſiſts of a body of five or ſix men, detached from a body on guard, and commanded by a ſerjeant.

They go every hour of the night, from the beating of the tattoo until the reveille: they are to walk in the ſtreets in garriſons, and all over the camp in the field, to prevent diſorders, or any number of people from aſſembling together: they are to ſee the lights in the ſoldiers barracks put out, and to take up all the ſoldiers they find out of their quarters. Sometimes patrols conſiſt of an officer and 30 or 40 men, as well infantry as cavalry; but then the enemy is generally near at hand, and conſequently the danger greater.

PATRON, among the Romans, was an appellation given to a maſter who had freed his ſlave. As ſoon as the relation of maſter expired, that of patron began: for the Romans in giving their ſlaves their freedom, did not deſpoil themſelves of all rights and privileges in them; the law ſtill ſubjected them to conſiderable ſervices and duties towards their patrons, the neglect of which was very ſeverely puniſhed.

Patron was alſo a name which the people of Rome gave to ſome great man, under whoſe protection they uſually put themſelves; paying him all kinds of honour and reſpect, and denominating themſelves his clients; while the patron, on his ſide, granted them his credit and protection.

PATRON, in the church of Rome, a ſaint, whoſe name a perſon bears, or under whoſe protection he is put, and whom he takes particular care to invoke: or a ſaint, in whoſe name a church or order is founded.

Patron, in the canon and common law, is a perſon, who having the advowſon of a parſonage, vicarage, or the like ſpiritual promotion, belonging to his manor, hath, on that account, the gift and diſpoſition of the benefice, and may preſent to it whenever it becomes vacant. The patron's right of diſpoſing of a benefice, originally ariſes either from the patron, or his anceſtors, &c. being the founders or builders of the church; from their having given lands for the maintenance thereof; or, from the church's being built on their ground; and frequently from all three together.

PATRONAGE, or **Advowson**, a ſort of incorporeal hereditament, conſiſting in the right of preſentation to a church or eccleſiaſtical benefice. Advowſon, *advocatio*, ſignifies *in clientelam recipere*, the taking into protection; and therefore is ſynonymous with patronage, *patronatus*: and he who has the right of advowſon is called the *patron of the church*. For, when lords of manors firſt built churches on their own demeſnes, and appointed the tithes of thoſe manors to be paid to the officiating miniſters, which before were given to the clergy in common (from whence aroſe the diviſion of pariſhes), the lord, who thus built a church, and endowed it with glebe or land, had of common right a power annexed of nominating ſuch miniſter as he pleaſed, (provided he were canonically qualified), to officiate in that church, of which he was the founder, endower, maintainer, or, in one word, the patron.

Blackſt. Comment.

Advowſons are either advowſons *appendant*, or advowſons *in groſs*. Lords of manors being originally the only founders, and of courſe the only patrons, of churches, the right of patronage or preſentation, ſo long as it continues annexed to the poſſeſſion of the manor, as ſome have done from the foundation of the church to this day, is called an *advowſon appendant*: and it will paſs, or be conveyed, together with the manor, as incident and appendant thereto, by a grant of the manor only, without adding any other words. But where the property of the advowſon has been once ſeparated from the property of the manor, by legal conveyance, it is called an *advowſon in groſs*, or at large, and never can be appendant any more; but is for the future annexed to the perſon of its owner, and not to his manor or lands.

Advowſons are alſo either *preſentative*, *collative*, or *donative*. And advowſon preſentative is where the patron hath a right of preſentation to the biſhop or ordinary, and moreover to demand of him to inſtitute his clerk if he finds him canonically qualified: and this is the moſt uſual advowſon. An advowſon collative is where the biſhop and patron are one and the ſame perſon: in which caſe the biſhop cannot preſent to himſelf; but he does, by the one act of collation, or conferring the benefice, the whole that is done in common caſes, by both preſentation and inſtitution. An advowſon donative is when the king, or any ſubject by his licence, doth found a church or chapel, and ordains that it ſhall be merely in the gift or diſpoſal of the patron; ſubject to his viſitation only, and not to that of the ordinary; and veſted abſolutely in the clerk by the patron's deed of donation, without preſentation, inſtitution, or induction. This is ſaid to have been anciently the only way of conferring eccleſiaſtical benefices in England; the method of inſtitution by the biſhop not being eſtabliſhed more early than the time of archbiſhop Becket in the reign of Henry II. and therefore, though pope Alexander III. in a letter to Becket, ſeverely inveighs againſt the *prava conſuetudo*, as he calls it, of inveſtiture conferred by the patron only, this however ſhews what was then the common uſage. Others contend, that the claim of the biſhops to inſtitution is as old as the firſt planting of Chriſtianity in this iſland; and in proof of it they allege a letter from the Engliſh nobility to the pope in the reign of Henry the third, recorded by Matthew Paris, which ſpeaks of preſentation to the biſhop as a thing immemorial. The truth ſeems to be, that, where the benefice was to be conferred on a mere layman, he was firſt preſented to the biſhop in order to receive ordination, who was at liberty to examine and refuſe him: but where the clerk was already in orders, the living was uſually veſted in him by the ſole donation of the patron; till about the middle of the 12th century, when the pope and his biſhops endeavoured to introduce a kind of feodal dominion over eccleſiaſtical benefices, and, in conſequence of that, began to claim and exerciſe the right of inſtitution univerſally, as a ſpecies of ſpiritual inveſtiture.

However this may be, if, as the law now ſtands, the true patron once waives this privilege of donation, and preſents to the biſhop, and his clerk is admitted and inſtituted, the advowſon is now become for ever preſentative, and ſhall never be donative any more. For theſe exceptions to general rules and common right, are ever looked upon by the law in an unfavourable view, and conſtrued as ſtrictly as poſſible. If therefore the patron, in whom ſuch peculiar right reſides, does once give up that right, the law, which loves uniformity, will interpret it to be done with an intention of giving it up for ever; and will therefore reduce it to the ſtandard of other eccleſiaſtical livings. See further, **Law**, Part III. N° clix. 5,—9.

Arms of **Patronage**, in heraldry, are thoſe on the top of which are ſome marks of ſubjection and dependence: thus the city of Paris bears the fleurs de lis in chief, to ſhew her ſubjection to the king; and the cardinals, on the top of their arms, bear thoſe of the pope, who gave them the hat, to ſhew that they are his creatures.

PATRONYMIC, among grammarians, is applied to ſuch names of men or women as are derived from thoſe of parents or anceſtors.

Patronymics are derived, 1. From the father; as Pelides, *i. e.* Achilles the ſon of Peleus. 2. From the mother; as Philyrides, *i. e.* Chiron the ſon of Philyra. 3. From the grandfather on the father's ſide; as Æacides, *i. e.* Achilles the grandſon of Æacus. 4. From the grandfather by the mother's ſide; as Atlantiades, *i. e.* Mercury the grandſon of Atlas. And, 5. From the kings and founders of nations; as Romulidæ, *i. e.* the Romans from their founder king Romulus.

The termination of Greek and Latin patronymics are chiefly four, viz. *des*, of which we have examples above; *as*, as Thaumantias, *i. e.* Iris the daughter of Thamaus; *is*, as Atlantis, *i. e.* Electra the daughter of Atlas; and *ne*, as Nerine, the daughter of Nereus. Of theſe terminations *des* is maſculine; and *as*, *is*, and *ne*, feminine: *des* and *ne* are of the firſt declenſion, *as* and *is* of the third.

PATROS, (Jeremiah, Ezekiel), appears from the context to be meant of a part of Egypt. Bochart thinks it denotes the Higher Egypt: the Septuagint tranſlate it the country of *Pathure;* in Pliny we have the *Nomos Phaturites* in the Thebais; in Ptolemy, *Pathyris*, probably the metropolis. From the Hebrew appellation *Patros* comes the gentilitious name *Pathruſim*, Moſes.

PATRU (Oliver), a counſellor in parliament, and dean of the French academy, was born at Pairs in 1604. He had an excellent faculty both of ſpeaking and writing. Upon his admiſſion into the French academy in 1640, he made an oration of thanks, that gave riſe to the cuſtom of admiſſory ſpeeches, which are ſtill in uſe in that ſociety. Mr de Vaugilas owns himſelf much indebted to him for his aſſiſtance in compoſing his Remarks on the French tongue, of which he was by far the greateſt maſter in France; ſo that he was conſulted as an oracle by all the beſt writers of that nation.

Patru was eſtimable for the qualities of his heart, as well as for thoſe of the head: was honeſt, generous, ſincere; and preſerved a gayneſs of character, which no ill-fortune could alter or affect. For this famous advocate, in ſpite of all his great talents, lived almoſt in a ſtate of indigence. The love of the belles lettres made him neglect the law; and the barren glory of being an oracle to the beſt French writers had more charms for him, than all the profits of the bar. Hence he became ſo poor, as to be reduced to the neceſſity of ſelling his books, which ſeemed dearer to him than his life; and would actually have ſold them for an under-price, if Boileau had not generouſly advanced him a larger ſum, with this further privilege, that he ſhould have the uſe of them as long as he lived. His death was preceded by a tedious illneſs, during which he received a preſent of 500 crowns from Colbert, as a mark of the eſteem which the king had for him. He died the 16th of January 1681. The prodigious care and exactneſs with which he retouched and finiſhed every thing he wrote, did not permit him to publiſh much. His miſcellaneous works were printed at Paris in 1670, 4to; the third edition of which, in 1714, 4to, was augmented with ſeveral pieces. They conſiſt of Pleadings, Orations, Letters, Lives of ſome of his friends, Remarks upon the French language, &c.

PAU, a handſome town of France, in the province of Gaſcony and territory of Bearne, with a parliament, a mint, and a caſtle where Henry IV. was born. It is ſeated on an eminence, at the foot of which runs the river Gave. W. Long. 0. 29. N. Lat. 43. 15.

PAVIA, an ancient and celebrated town of Italy, in the duchy of Milan, and capital of the Paveſan, with an univerſity and biſhop's ſee. It is defended by ſtrong walls, large ditches, good ramparts, excellent baſtions, and a bridge over the river Taſin. In the centre of the town is a ſtrong caſtle, where the duke of Milan was wont to reſide. There are a great number of magnificent caſtles, and ſome colleges. It was taken by the duke of Savoy in 1706; by the French in 1733; by the French and Spaniards in 1745; but retaken by the Auſtrians in 1746. E. Long. 9. 5. N. Lat. 45. 10

PAVILION, in architecture, ſignifies a kind of turret or building, uſually inſulated, and contained under a ſingle roof; ſometimes ſquare, and ſometimes in form of a dome: thus called from the reſemblance of its roof to a tent.

Pavilions are ſometimes alſo projecting pieces, in the front of a building, marking the middle thereof; ſometimes the pavilion flanks a corner, in which caſe it is called *an angular pavilion*. The Louvre is flanked with four pavilions: the pavilions are uſually higher than the reſt of the building. There are pavilions built in gardens, commonly called *ſummer-houſes*, *pleaſure-houſes*, &c. Some caſtles or forts conſiſt only of a ſingle pavilion.

Pavilion, in military affairs, ſignifies a tent raiſed on poſts, to lodge under in the ſummer time.

Pavilion, is alſo ſometimes applied to flags, colours, enſigns, ſtandards, banners, &c.

Pavilion, in heraldry, denotes a covering in form of a tent, which inveſts or wraps up the armories of divers kings and ſovereigns, depending only on God and their ſword.

The pavilion conſiſts of two parts; the top, which is the chapeau, or coronet; and the curtain, which makes the mantle.

None but ſovereign monarchs, according to the French heralds, may bear the pavilion entire, and in all its parts. Thoſe who are elective, or have any dependence, ſay the heralds, muſt take off the head, and retain nothing but the curtains.

Pavilions, among jewellers, the underſides and corners of the brilliants, lying between the girdle and the collet.

PAUL (St) the apoſtle, was born at Tarſus in Cilicia, of Jewiſh parents. He was educated at Tarſus; which, as Strabo informs us, excelled Alexandria, Athens, and Rome itſelf, for polite learning. Thence he was ſent to Jeruſalem, to ſtudy the law under Gamaliel. Here he became a Phariſee, and engaged in a violent perſecution; but was wonderfully converted in his way to Damaſcus. After which he preached the goſpel in various parts, until he was at laſt ſent to Rome, where he is ſaid to have converted Poppea Sabina, Nero's concubine; for which Nero being enraged againſt him, commanded him to be beheaded.

Paul, firſt biſhop of Narbonne, or Sergius Paulus the proconſul, converted and made biſhop by St Paul, was deſcended form one of the beſt families of Rome. It is ſaid the apoſtle called himſelf *Paul* from his name. The Spaniards will have him to be their apoſtle, which is not improbable; and it is ſaid he died a martyr at Narbonne.

Paul (Father), was born at Venice in 1552. He was educated by his uncle Ambroſio Morelli, and ſoon made great progreſs in learning. He was remarkable for two qualities, which ſeldom meet in the ſame perſon; a ſtrong memory, and clear judgment. He took upon him the habit of the Servites in 1566. Upon entering into this order, he changed his name of *Peter Sarpi* for that of *Paul*. He was afterwards chaplain to the duke of Mantua, and reader of poſitive and caſuiſtical divinity and canon law in that city. So he became a perfect maſter of the Hebrew language and of hiſtory; but ſhewed the utmoſt contempt for judicial aſtrology. When weary of a court life, he returned to his convent at Venice; and ſo intenſely applied himſelf to ſtudy, that he injured his health by it. He was choſen provincial of his order for the province of Venice at 26 years of age; and diſcharged this poſt with ſuch honour, that 1759 he was appointed, with two others, to draw up new regulations and ſtatutes for his order. This he executed with great ſucceſs; and when his office of provincial was expired, he retired for three years to the ſtudy of natural and experimental philoſophy and anatomy, in which he is ſaid to have made ſome uſeful diſcoveries. He was then choſen procurator-general of his order; and during his reſidence at Rome was greatly eſteemed by pope Sixtus V. and contracted an intimate friendſhip with cardinal Bellarmine and other eminent perſons. Some time after, he was accuſed of hereſy; and brought into a ſeries of troubles, which he ſupported with exemplary patience and magnanimity; till at length, growing extremely odious to the pope's party, he was aſſaſſinated, and left for dead, by five ruffians, who retired to the palace of the pope's nuncio in Venice, from whence they eſcaped to Ravenna or Ferrara. Theſe circumſtances diſcovered who were concerned in this attempt. He recovered, however, of his wounds; and retired to a place of ſecurity, where he wrote his hiſtory of the council of Trent, which he compiled principally for the ſake of king James I. of England, with whom he correſponded. His name, ever ſince the interdict, was become famous all over Europe; and two kings made him very advantageous offers to reſide in their dominions. He died as he had lived, with piety and reſignation, in 1623. He was a good controverſial writer, a judicious and elegant hiſtorian.

PAULIONISTS, in church-hiſtory, Chriſtian heretics of the third century, diſciples of Paul Samotaſenſis biſhop of Antioch, who denied Chriſt's divinity; maintaining, that, when we call him the Son of God, we do not therefore mean that he is truly and really God; but only that he was ſo perfect a man, and ſo ſuperior in virtue to all others, that he had this name given him by way of eminence.

PAULICIANS, Chriſtian heretics of the ſeventh century, diſciples of one Conſtantine a native of Armenia, and a favourer of the errors of Manes; who, as the name *Manichee* was become odious, gave thoſe of his ſect the name of *Paulicians*, on the pretence that they followed only the doctrine of St Paul.

PAVO, the PEACOCK, in ornithology; a genus belonging to the order of gallinæ. The head is covered with feathers which bend backwards; the feathers of the tail are very long, and beautifully variegated with eyes of different colours. There are three ſpecies.

1. The criſtatus, or common peacock of Engliſh authors, has a compreſſed creſt and ſolitary ſpurs. It is a native of India; and we are aſſured, that they are ſtill found in a wild ſtate in the iſlands of Ceyland and Java. So beautiful a bird could not long be permitted to be a ſtranger in the more diſtant parts: for ſo early as the days of Solomon, we find, among the articles imported in his Tarſhiſh navies, apes and peacocks. A monarch ſo converſant in all branches of natural hiſtory, "who ſpoke of trees, from the cedar of Lebanon, even unto the hyſſop that ſpringeth out of the wall; who ſpoke alſo of beaſts and of fowl," would certainly not neglect furniſhing his officers with inſtructions for collecting every curioſity in the countries they voyaged to, which gave him a knowledge that diſtinguiſhed him from all the princes of his time. Ælian relates, that they were brought into Greece from ſome barbarous country; and that they were held in ſuch high eſteem, that a male and female were valued at Athens at 1000 drachmæ, or 32 l. 5 s. 10 d. Their next ſtep might be to Samos; where they were preſerved about the temple of Juno, being the birds ſacred to the goddeſs: and Gellius, in his *Noctes Atticæ*, c. 16. commends the excellency of the Samian peacocks. It is therefore probable, that they were brought here originally for the purpoſes of ſuperſtition, and afterwards cultivated for the uſes of luxury. We are alſo told, when Alexander was in India, he found vaſt numbers of wild ones on the banks of the Hyarotis; and was ſo ſtruck with their beauty, as to appoint a ſevere puniſhment on any perſon that killed them.

Peacock's creſts, in ancient times, were among the ornaments of the kings of England. Ernald de Acelent was fined to king John in 140 palfries, with ſackbuts, lorains, gilt ſpurs, and peacock's creſts, ſuch as would be for his credit.

2. The bicalcaratas has a ſmall creſt and double ſpurs. It is a native of China.

3. The muticus has a ſharp-pointed creſt, and no ſpurs; the orbits of the eyes are red. It is found in Japan.

PAVO, in aſtronomy. See ASTRONOMY, n° 206.

PAURÆDASTYLÆ, in natural hiſtory, the name of a genus of perfect cryſtals with double pyramids, and no intermediate column, compoſed of 12 planes, or two hexangular pyramids joined baſe to baſe.

PAUSANIA, in Grecian antiquity, a feſtival in which were ſolemn games, wherein nobody contended but free-born Spartans; in honour of Pauſanias the Spartan general, under whom the Greeks overcame the Perſians in the famous battle of Platæa.

PAUSANIAS, a learned Greek hiſtorian and orator, in the ſecond century, under the reign of Antoninus the philoſopher, was the diſciple of Herodus Atticus. He lived for a long time in Greece; and afterwards went to Rome, where he died at a great age. He wrote an excellent Deſcription of Greece, in ten books; in which we find not only the ſituation of places, but the antiquities of Greece, and every thing moſt curious and worthy of knowledge. Abbé Gedoin has given a French tranſlation of it, in 2 vols 4to.

PAUSE, a ſtop or ceſſation in ſpeaking, ſinging, playing, or the like. One uſe pointing in grammar is to make proper pauſes, in certain places. There is a pauſe in the middle of each verſe; in an hemiſtich, it is called a *reſt* or *repoſe*. See POETRY, n° 118, &c. and READING, n° xi.

PAW, in the manege. A horſe is ſaid to paw the ground, when, his leg being either tired or painful, he does not reſt it upon the ground, and fears to hurt himſelf as he walks.

PEA, in botany. See PISUM.

PEACH, in botany. See AMYGDALUS.

PEACOCK, in ornithology. See PAVO.

PEAK *of* DERBYSHIRE, a chain of very high mountains in the county of Derby in England, famous for the mines they contain, and for their remarkable caverns. The moſt remarkable of theſe are Pool's-hole and Elden-hole. The former is a cave at the foot of a high hill called *Coitmoſs*, ſo narrow at the entrance that paſſengers are obliged to creep on all-fours; but it ſoon opens to a conſiderable height, extending to above a quarter of a mile, with a roof ſomewhat reſembling that of an ancient cathedral. By the petrifying water continually dropping in many parts of the cave are formed a variety of curious figures and repreſentations of the works both of nature and art. There is a column here as clear as alabaſter, which is called the *Queen of Scots Pillar*, becauſe Queen Mary is ſaid to have proceeded thus far when ſhe viſited the cavern. If a piſtol is fired by this pillar, it will make a report as loud as a cannon. Near the extremity there is a hollow in the roof, called the *Needle's eye*; in which if a candle is placed, it will repreſent a ſtar in the firmament to thoſe who are below. At a little diſtance from this cave is a ſmall clear ſtream conſiſting of hot and cold water, ſo near each other, that the finger and thumb of the ſame hand may be put, the one into the hot water, and the other into the cold.

Elden-hole is a dreadful chaſm in the ſide of a mountain; which, before the latter part of the laſt century, was thought to be altogether unfathomable. In the time of queen Elizabeth, a poor man was let down into it for 200 yards; but he was drawn up in a frenzy, and ſoon after died. In 1682, it was examined by Captain Collins, and in 1699 by Captain Sturmy, who publiſhed their accounts in the Philoſophical Tranſactions. The latter deſcended by ropes fixed at the top of an old lead-ore pit, four fathoms almoſt perpendicular, and from thence three fathoms more obliquely, between two great rocks. At the bottom of this he found an entrance into a very ſpacious cavern, from whence he deſcended along with a miner for 25 fathoms perpendicular. At laſt they came to a great river or water, which he found to be 20 fathoms broad and eight fathoms deep. The miner who accompanied him, inſiſted that this water ebbed and flowed with the ſea; but the Captain diſproved this aſſertion by remaining in the place from three hours flood to two hours ebb, during which time there was no alteratiun in the height of the water. As they walked by the ſide of this water, they obſerved a hollow in the rock ſome feet above them. The miner went into this place, which was the mouth of another cavern; and walked for about 70 paces in it, till he juſt loſt ſight of the Captain. He then called to him, that he had found a rich mine; but immediately after came running out and crying, that he had ſeen an evil ſpirit; neither could any perſuaſions induce him to return. The floor of theſe caverns is a kind of white ſtone enamelled with lead ore, and the roofs are encruſted with ſhining ſpar. On his return from this ſubterraneous journey, Captain Sturmy was ſeized with a violent head-ach, which, after continuing four days, terminated in a fever, of which he died in a ſhort time.

A few years ago this cavern was viſited by the late Mr James Ferguſon: who tells us, that it conſiſts of two hollows one over another; but that the mouth of the lowermoſt is now ſtopped up by planks of timber laid acroſs it, on which are a heap of ſtones thrown in at the upper mouth with a deſign to fill up the cavern entirely; which, however, will probably be never accompliſhed on account of its vaſt ſize.

PEAN, in heraldry, is when the field of a coat of arms is ſable, and the powderings or.

PEAR, in botany. See PYRUS.

PEARCE (Dr), lord biſhop of Rocheſter, was the ſon of a diſtiller in High Holborn. He married Miſs Adams, the daughter of a diſtiller in the ſame neighbourhood, with a conſiderable fortune, who lived with him 52 years in the higheſt degree of connubial happineſs. He had his education in Weſtminſter ſchool, where he was diſtinguiſhed by his merit, and elected one of the king's ſcholars. In 1710, when he was 20 years old, he was elected to Trinity College, Cambridge. During the firſt years of his reſidence at the univerſity, he ſometimes amuſed himſelf with lighter compoſitions, ſome of which are inſerted in the Guardian and Spectator. In 1716, he publiſhed his edition of *Cicero de Oratore*, and, at the deſire of a friend, luckily dedicated it to Lord Chief Juſtice Parker, (afterwards Earl of Macclesfield,) to whom he was a ſtranger. This incident laid the foundation of his future fortune: for Lord Parker ſoon recommended him to Dr Bentley, maſter of Trinity, to be made one of the fellows; and the doctor conſented to it on this condition, that his lordſhip would promiſe to *unmake* him again as ſoon as it lay in his power to give him a living. In 1717, Mr Pearce was ordained at the age of 27; having taken time enough, as he thought, to attain a ſufficient knowledge of the ſacred office. In 1718, Lord Parker was appointed chancellor, and invited Mr Pearce to live with him in his houſe as chaplain. In 1719, he was inſtituted into the rectory of Stapleford Abbots, in Eſſex; and in 1720, into that of St Bartholomew, behind the Royal Exchange, worth 400 l. *per annum*. In 1723, the lord chancellor preſented him to St Martin's in the Fields. His Majeſty, who was then at Hanover, was applied to in favour of St Claget, who was then along with him; and the doctor actually kiſſed hands upon the occaſion: but the chancellor, upon the king's return, diſputed the point, and was permitted to preſent Mr Pearce.—Mr Pearce ſoon attracted the notice and eſteem of perſons in the higheſt ſtations and of the greateſt abilities. Beſide Lord Parker, he could reckon amongſt his patrons or friends, Lord Macclesfield, Mr Pulteney (afterwards Earl of Bath), archbiſhop Potter, Lord Hardwicke, Sir Iſaac Newton, and other illuſtrious perſonages.—In 1724, the degree of doctor of divinity was conferred on him by archbiſhop Wake. The ſame year he dedicated to his patron, the Earl of Macclesfield, his edition of *Longinus on the Sublime*, with a new Latin verſion and notes.

When the church of St Martin's was rebuilt, Dr Pearce preached a ſermon at the conſecration, which he afterwards printed, and accompanied with an eſſay on the origin and progreſs of temples, traced from the rude ſtones which were firſt uſed for altars, to the noble ſtructure of Solomon, which he conſiders as the firſt temple completely covered. His obſervations on that building, which is called the *temple of Dagon*, removes part of the difficulty which preſents itſelf in the narration of the manner in which Samſon deſtroyed it.

The deanry of Wincheſter becoming vacant, Dr Pearce was appointed dean in 1739; and in the year 1744 he was elected prolocutor of the lower houſe of convocation for the province of Canterbury. His friends now began to think of him for the epiſcopal dignity; but Mr Dean's language rather delined it. However, after ſeveral difficulties had been ſtarted and removed, he conſented to accept the biſhoprick of Bangor, and promiſed Lord Hardwicke to do it with a good grace. He accordingly made proper acknowledgments of the royal goodneſs, and was conſecrated Feb. 12. 1748. Upon the declining ſtate of health of Dr Wilcocks, biſhop of Rocheſter, the biſhop of Bangor was ſeveral times applied to by archbiſhop Herring to accept of Rocheſter, and the deanry of Weſtminſter, in exchange for Bangor; but the biſhop then firſt ſignified his deſire to obtain leave to reſign and retire to a private life. His lordſhip, however, upon being preſſed, ſuffered himſelf to be prevailed upon.—"My Lord," ſaid he to the Duke of Newcaſtle, "your grace offers theſe dignities to me in ſo generous and friendly a manner, that I promiſe you to accept them." Upon the death of biſhop Wilcocks he was accordingly promoted to the ſee of Rocheſter and deanry of Weſtminſter in 1756. Biſhop Sherlock died in 1761, and Lord Bath offered his intereſt for getting the biſhop of Rocheſter appointed to ſucceed him in the dioceſe of London; but the biſhop told his lordſhip, that he had determined never to be biſhop of London or archbiſhop of Canterbury.

In the year 1763, his lordſhip being 73 years old, and finding himſelf leſs fit for the buſineſs of his ſtations as biſhop and dean, informed his friend lord Bath of his intention to reſign both, and live in a retired manner upon his private fortune. Lord Bath undertook to acquaint his majeſty; who named a day and hour, when the biſhop was admitted alone into the cloſet. He told the king, that he wiſhed to have ſome interval between the fatigues of buſineſs and eternity; and deſired his majeſty to conſult proper perſons about the propriety and legality of his reſignation. In about two months the king informed him, that Lord Mansfield ſaw no objection; and that Lord Northington, who had been doubtful, on farther conſideration thought that the requeſt might be complied with. Unfortunately for the biſhop, lord Bath applied for biſhop Newton to ſucceed. This alarmed the miniſtry, who thought that no dignities ſhould be obtained but through their hands. They therefore oppoſed the reſignation; and his majeſty was informed that the biſhops diſliked the deſign. His majeſty ſent to him again; and at a third audience told him, that he muſt think no more of reſigning. The biſhop replied, "Sir, I am all duty and ſubmiſſion;" and then retired.

In 1768 he obtained leave to reſign the deanry; in 1773, he loſt his lady; and after ſome months of lingering decay, he died at Little Ealing, June 29, 1774.

This eminent prelate diſtinguiſhed himſelf in every part of his life by the virtues proper to his ſtation. His literary abilities, and application to ſacred and philological learning, appear by his works; the principal of which are, A letter to the clergy of the church of England, on occaſion of the biſhop of Rocheſter's commitment to the Tower, 2d ed. 1722. Miracles of Jeſus vindicated, 1727 and 1728. A review of the text of Milton, 1733. Two letters againſt Dr Middleton, occaſioned by the doctor's letter to Waterland, on the publication of his treatiſe, intitled *Scripture Vindicated*, 3d edit. 1752. And ſince his death, a commentary with notes on the four Evangeliſts and the Acts of the Apoſtles, together with a new tranſlation of St Paul's firſt Epiſtle to the Corinthians, with a paraphraſe and notes, have been publiſhed, with his life prefixed, from original MSS. in 2 vols 4to.

PEARCH, in ichthyology. See PERCA.

The pearch affords good ſport for the angler. The beſt time for their biting is when the ſpring is over, and before the heats of ſummer come on. At this time they are very greedy; and the angler, with good management, may take at one ſtanding all that are in the hole, be they ever ſo many.

The proper baits are a minow or young frog; but the worm called the *brandling*, well ſcowered, is alſo excellent at all times of the year. When the pearch bites, he ſhould always have a great deal of time allowed him to ſwallow the bait.

The pearch will bite all day long, if the weather be cloudy; but the beſt time is from eight to ten in the morning, and from three till ſix in the afternoon. The pearch is very abſtemious in winter, and will ſeldom bite in this ſeaſon of the year; if he does at all, it is in the middle of the day: at which time indeed all fiſh bite beſt at that ſeaſon.

If the bait be a minow, which is the bait that affords moſt diverſion to the angler, it muſt be faſtened to the hook alive, by putting the hook through the upper lip or back-fin; it muſt be kept at about midwater, and the float muſt be a quill and a cork, that the minow alone may not be able to ſink it.

The line muſt be of ſilk, and ſtrong; and the hook armed with a ſmall and fine wire, that if a pike ſhould take the bait, as is not unfrequently the caſe, he may be taken. The way to carry the minows or ſmall gudgeons alive for baits is this: A tin-pot is to be provided, with holes in the lid, and filled with water; and the fiſh being put in this, the water is to be changed once in a quarter of an hour by the holes, without taking off the lid at any time, except when the bait is to be taken out.

A ſmall caſting-net, made for theſe little fiſh, ſhould be taken out with the pearch-tackle; and one or two caſts of this will take baits enough for the day, without any farther trouble. When the bait is a frog, the hook is to be faſtened to the upper part of the leg. The beſt place for the fiſhing for pearch is in the turn of the water near ſome gravelly ſcour. A place of this kind being pitched upon, it ſhould be baited over-night with lobworms chopped to pieces; and in the morning, on going to it, the depth is to be regularly plumbed, and then the hook is to be baited with the worm or other bait; and as it drags along, the pearch will ſoon ſeize upon it.

Pearch-*Glue*, the name of a kind of glue, of remarkable ſtrength and purity, made from the ſkins of pearches.

PEARL, in natural hiſtory, a hard, white, ſhining body, uſually roundiſh, found in a teſtaceous fiſh reſembling an oyſter.

Pearls, though eſteemed of the number of gems by our jewellers, and highly valued, not only at this time, but in all ages, proceed only from a diſtemper in the creature that produces them, analagous to the bezoars, and other ſtony concretions in ſeveral animals of other kinds.

The fiſh in which theſe are uſually produced is the Eaſt-Indian pearl-oyſter, as it is commonly called. Beſides this ſhell, there are many others that are found to produce pearls; as the common oyſter, the muſcle, and ſeveral others; the pearls of which are often very good; but thoſe of the true Indian berberi, or pearl-oyſter, are in general ſuperior to all. The ſmall or ſeed-pearls, alſo called *ounce-pearls*, from their being ſold by the ounce and not by tale, are vaſtly the moſt numerous and common: but, as in diamonds, among the multitudes of ſmall ones, there are ſmaller numbers and larger found, ſo in pearls there are larger and larger kinds; but as they increaſe in ſize, they are proportionably leſs frequent; and this is one reaſon of their great price. We have Scotch pearls frequently as big as a little tare, ſome as big as a large pea, and ſome few of the ſize of a horſe-bean; but theſe are uſually of a bad ſhape, and of little value in proportion to their weight. Philip II. of Spain had a pearl perfect in its ſhape and colour, and of the ſize of a pigeon's egg. The fineſt, and what is called the true ſhape of the pearl, is a perfect round; but if pearls of a conſiderable ſize are of the ſhape of a pear, as is not unfrequently the caſe, they are not leſs valued, as they ſerve for ear-rings and other ornaments. Their colour ought to be a pure white; and that not a dead and lifeleſs, but a clear and brilliant one: they muſt be perfectly free from any foulneſs, ſpot, or ſtain; and their ſurfaces muſt be naturally ſmooth and gloſſy; for they bring their natural poliſh with them, which art is not able to improve.

All pearls are formed of the matter of the ſhell, and conſiſt of a number of coats ſpread with perfect regularity one over another, in the manner of the ſeveral coats of an onion, or like the ſeveral ſtrata of the ſtones found in the bladders or ſtomachs of animals, only much thinner.

Manner of fiſhing for Pearls *in the Eaſt Indies.* There are two ſeaſons for pearl-fiſhing: the firſt is in March and April, and the laſt in Auguſt and September; and the more rain there falls in the year, the more plentiful are theſe fiſheries. At the beginning of the ſeaſon there are ſometimes 250 barks on the banks; the larger barks have two divers, and the ſmaller one. As ſoon as the barks arrive at the place where the fiſh lie, and have caſt anchor, each diver binds a ſtone, ſix inches thick and a foot long, under his body; which ſerves him as ballaſt, prevents his being driven away by the motion of the water, and enables him to walk more ſteadily under the waves. They alſo tie another very heavy ſtone to one foot, by which they are very ſpeedily ſent to the bottom of the ſea: and as the oyſters are uſually firmly faſtened to the rocks, they arm their hands with leather mittens, to prevent their being wounded in pulling them violently off; but this taſk ſome perform with an iron rake. In the laſt place, each diver carries down with him a large net in the manner of a ſack, tied to his neck by a long cord, the other end of which is faſtened to the ſide of the bark. This net is to hold the oyſters gathered from the rock; and the cord is to pull up the diver when his bag is full, or he wants air.

In this equipage he ſometimes precipitates himſelf ſixty feet under water; and as he has no time to loſe, he no ſooner arrives at the bottom, than he begins to run from ſide to ſide, tearing up all the oyſters he meets with, and cramming them into his budget.

At whatever depth the divers are, the light is ſo great, that they eaſily ſee whatever paſſes in the ſea; and, to their great conſternation, ſometimes perceive monſtrous fiſhes, from which all their addreſs in mudding the water, &c. will not always ſave them, but they unhappily become their prey: and of all the dangers of the fiſhery, this is one of the greateſt and moſt uſual. The beſt divers will keep under water near half an hour, and the reſt do not ſtay leſs than a quarter. During this time they hold their breath without the uſe of oils or any other liquors; only acquiring the habit by long practice. When they find themſelves ſtraitened, they pull the rope to which the bag is faſtened, and hold faſt by it with both hands; when thoſe in the bark, taking the ſignal, heave them up into the air, and unload them of their fiſh; which is ſometimes 500 oyſters, and ſometimes not above 50. Some of the divers need a moment's reſpite to recover breath; others jump in again inſtantly, continuing this violent exerciſe without intermiſſion for ſeveral hours.

On the ſhore they unload their barks, and lay their oyſters in an infinite number of little pits dug in the ſand four or five feet ſquare, raiſing heaps of ſand over them to the height of a man; and in this condition they are left till the rain, wind, and ſun, have obliged them to open, which ſoon kills them: upon this the fleſh rots and dries, and the pearls, thus diſengaged, fall into the pit, on their taking out the ſhells. After clearing the pits of the groſſer filth, they ſift the ſand ſeveral times in order to find the pearl; but, whatever care they take, they always loſe a great many. After cleaning and drying the pearls, they are paſſed through a kind of ſieve, according to their ſizes; the ſmalleſt are then ſold as ſeed-pearls, and the reſt put up to auction, and ſold to the higheſt bidder.

Artificial Pearls. Attempts have been made to take out ſtains from pearls, and to render the foul opaque-coloured ones equal in luſtre to the oriental. Abundance of proceſſes are given for this purpoſe in books of ſecrets and travels; but they are very far from anſwering what is expected from them. Pearls may be cleaned indeed from any external foulneſſes by waſhing and rubbing them with a little Venice ſoap and warm water, or with ground rice and ſalt, with ſtarch and powder-blue, plaſter of Paris, coral, white vitriol and tartar, cuttle-bone, pumice-ſtone, and other ſimilar ſubſtances; but a ſtain that reaches deep into the ſubſtance of the pearls is impoſſible to be taken out. Nor can a number of ſmall pearls be united into a maſs ſimilar to an entire natural one, as ſome pretend.

There are, however, methods of making artificial pearls, in ſuch manner as to be with difficulty diſtinguiſhed from the beſt oriental. The ingredient uſed for this purpoſe was long kept a ſecret; but is now diſcovered to be a fine ſilver-like ſubſtance found upon the under ſide of the ſcales of the blay or bleak fiſh. The ſcales, taken off in the uſual manner, are waſhed and rubbed with freſh parcels of fair water, and the ſeveral liquors ſuffered to ſettle: the water being then poured off, the pearly matter remains at the bottom, of the conſiſtence of oil, called by the French *eſſence d'orient*. A little of this is dropped into a hollow bead of bluiſh glaſs, and ſhaken about ſo as to line the internal ſurface; after which the cavity is filled up with wax, to give ſolidity and weight. Pearls made in this manner are diſtinguiſhable from the natural only by their having fewer blemiſhes.

*Mother-of-*PEARL is the ſhell, not of the pearl oyſter, but of another ſea-fiſh of the oyſter kind. This ſhell, on the inſide, is extremely ſmooth, and of the whiteneſs and water of pearl itſelf: it has alſo the ſame luſtre on the outſide after the external laminæ have been taken off by aquafortis and the lapidary's mill. Mother of pearl is uſed in inlaid works, and in ſeveral toys, as ſnuff-boxes, &c.

PEARSON (John), a very learned Engliſh biſhop in the 17th century, was born at Snoring in 1613. After his education at Eton and Cambridge, he entered into holy orders in 1639, and was the ſame year collated to the prebend of Netherhaven in the church of Sarum. In 1640 he was appointed chaplain to the lord keeper Finch, and by him preſented to the living of Torrington in Suffolk. In 1650 he was made miniſter of St Clement's, Eaſt-cheap, in London. In 1657, he and Mr Gunning had a diſpute with two Roman Catholics, upon the ſubject of ſchiſm; a very unfair account of which was printed at Paris in 1658. Some time after, he publiſhed his *Expoſition of the Creed*, and ſeveral other works. After various preferments, he was advanced in 1672 to the ſee of Cheſter; where he died, in 1686.

PEAT, a kind of turf uſed for fuel in ſeveral countries. See CHEMISTRY, n° 516.

There are very conſiderable differences in peat, proceeding perhaps wholly from different mineral admixtures; for the ſubſtance of the peat is plainly of vegetable origin, whence it is found to anſwer for the ſmelting of ores, and the reduction of metallic calces, nearly in the ſame manner as the coals of wood. Some ſorts yield in burning a very diſagreeable ſmell, which extends to a great diſtance; whilſt others are inoffenſive. Some burn into grey or white, and others into red ferrugineous aſhes. The aſhes yield, on elixation, a ſmall quantity of alkaline ſalt, with ſometimes one and ſometimes another ſalt of the neutral kind.

The ſmoke of peat does not preſerve or harden fleſh like that of wood; and the ſoot, into which it condenſes, is more diſpoſed to liquefy in moiſt weather. On diſtilling peat in cloſe veſſels, there ariſes a clear inſipid phlegm, an acid liquor, which is ſucceeded by an alkaline one, and a dark coloured oil. The oil has a very pungent taſte; and an empyreumatic ſmell, leſs fetid than that of animal ſubſtances, more ſo than that of mineral bitumens: it congeals in the cold into a pitchy maſs, which liquefies in a ſmall heat: it readily catches fire from a candle, but burns leſs vehemently than other oils, and immediately goes out upon removing the external flame: it diſſolves almoſt totally in rectified ſpirit of wine into a dark browniſh red liquor.

PEBBLES, the name of a genus of foſſils, diſtinguiſhed from the flints and homochroa by their having a variety of colours. Theſe are defined to be ſtones compoſed of a cryſtalline matter debaſed by earths of various kinds in the ſame ſpecies, and then ſubject to veins, clouds, and other variegations, uſually formed by incruſtation round a central nucleus, but ſometimes the effect of a ſimple concretion; and veined like the agates, by the diſpoſition which the motion of the fluid they were formed in gave their differently coloured ſubſtances.

The variety of pebbles is ſo great, that an haſty deſcriber would be apt to make almoſt as many ſpecies as he ſaw ſpecimens. A careful examination will teach us, however, to diſtinguiſh them into a certain number of eſſentially different ſpecies, to which all the reſt may be referred as accidental varieties. When we find the ſame colours, or thoſe reſulting from a mixture of the ſame, ſuch as nature frequently makes in a number of ſtones, we ſhall eaſily be able to determine that theſe are all of them the ſame ſpecies, though of different appearances; and that whether the matter be diſpoſed of in one or two, or in 20 cruſts, laid regularly round a nucleus; or thrown irregularly, without a nucleus, into irregular lines; or laſtly, if blended into an uniform maſs.

Theſe are the three ſtates in which every pebble is found; for if it has been naturally and regularly formed by incruſtation round a certain nucleus, we find that always the ſame in the ſame ſpecies, and the cruſts not leſs regular and certain. If the whole has been more haſtily formed, and the reſult only of one ſimple concretion, if that has happened while its different ſubſtances were all moiſt and thin, they have blended together and made a mixed maſs of the joint colour of them all. But if they have been ſomething harder when this has happened, and too far concreted to diffuſe wholly among one another, they are found thrown together into irregular veins. Theſe are the natural differences of all the pebbles; and having regard to theſe in the ſeveral variegations, all the known pebbles may be reduced to 34 ſpecies.

PECCANT, in medicine, a term uſed for thoſe humours of the body which offend either by their quantity or quality.

PECCARY, or TAJACU, in zoology; a ſpecies of SUS.

PECK, a meaſure of capacity, four of which make a buſhel.

PECORA, in zoology, the fifth order of the claſs mammalia, in the Linnean ſyſtem. See ZOOLOGY.

PECTEN, the SCALLOP; a genus of ſhell-fiſh, the characters of which are theſe: The animal is a tethys; the ſhell bivalve and unequal; the hinge toothleſs, having a ſmall ovated hollow. This ſhell-fiſh is one of the ſpinners, having the power of ſpinning threads like the muſcle: but they are much ſhorter and coarſer than even thoſe of that fiſh; ſo that they can never be wrought into any kind of work like the longer and finer threads of the pinna marina. The uſe of the threads which are ſpun by the ſcallop is to fix the creature to any ſolid body near its ſhell. All theſe proceed, as in the muſcle, from one common trunk. It is an evident proof that the fiſh has a power of fixing itſelf at pleaſure to any ſolid body by means of theſe threads, that after ſtorms the ſcallops are often found toſſed upon rocks, where there were none the day before; and yet theſe are fixed by their threads, as well as thoſe which had remained ever ſo long in their place. They form their threads in the very ſame manner with the muſcle; only their organ which ſerves for ſpinning is ſhorter, and has a wider hollow, whence the threads are neceſſarily thicker and ſhorter. The moſt remarkable ſpecies of this genus is,

The *maximus*, or great ſcallop, with 14 rays, very prominent and broad; ſtriated lengthwiſe above and below. Theſe grow to a large ſize; are found in beds by themſelves; are dredged up, and barrelled for ſale. The ancients ſay that they have a power of removing themſelves from place to place by vaſt ſprings or leaps. This ſhell was called by the Greeks κτεις, by the Latins *pecten*; and was uſed by both as a food. When dreſſed with pepper and cummin, it was taken medicinally.

The ſcallop was commonly worn by pilgrims on their hat, or the cape of their coat, as a mark that they had croſſed the ſea in their way to the Holy Land, or ſome diſtant object of devotion.

PECTORAL, an epithet for medicines good in diſeaſes of the breaſt and lungs.

PECTORALIS, in anatomy. See there, *Table of the Muſcles*.

PECULATE, in civil law, the crime of embezzling the public money, by a perſon intruſted with the receipt, management, or cuſtody thereof. This term is alſo uſed by civilians for a theft, whether the thing be public, fiſcal, ſacred, or religious.

PECULIAR, in the canon law, ſignifies a particular pariſh or church that has juriſdiction within itſelf for granting probates of wills and adminiſtrations, exempt from the ordinary or biſhop's courts. The king's chapel is a royal peculiar, exempt from all ſpiritual juriſdiction, and reſerved to the viſitation and immediate government of the king himſelf. There is likewiſe the archbiſhop's peculiar; for it is an ancient privilege of the ſee of Canterbury, that wherever any manors or advowſons belong to it, they forthwith become exempt from the ordinary, and are reputed peculiars: there are 57 ſuch peculiars in the ſee of Canterbury.

Beſides theſe, there are ſome peculiars belonging to deans, chapters, and prebendaries, which are only exempted from the juriſdiction of the archdeacon: theſe are derived from the biſhop, who may viſit them, and to whom there lies an appeal.

PECULIARS (*Court of*), is a branch of, and annexed to, the court of ARCHES. It has a juriſdiction over all thoſe pariſhes diſperſed through the province of Canterbury in the midſt of other dioceſes, which are exempt from the ordinary's juriſdiction, and ſubject to the metropolitan only. All eccleſiaſtical cauſes, ariſing within theſe peculiar or exempt juriſdictions, are originally cognizable by this court; from which an appeal lay formerly to the pope, but now by the ſtat. 25 H. VIII. c. 19. to the king in chancery.

PECULIUM, the ſtock or eſtate which a perſon, in the power of another, as a ſlave, may acquire by his induſtry.

In the Romiſh church, peculium denotes the goods which each religious reſerves and poſſeſſes to himſelf.

PEDALS, the largeſt pipes of an organ, ſo called becauſe played and ſtopped with the foot. The pedals are made ſquare, and of wood; they are uſually 13 in number. They are of modern invention, and ſerve to to carry the ſounds of an octave deeper than the reſt. See ORGAN.

PEDAGOGUE, or PÆDAGOGUE, a tutor or maſter, to whom is committed the diſcipline and direction of a ſcholar, to be inſtructed in grammar and other arts. The word is formed from the Greek παιδων αγωγος, *puerorum ductor*, " leader of boys."

M. Fleury obſerves, that the Greeks gave the name *pædagogus* to ſlaves appointed to attend their children, lead them, and teach them to walk, &c. The Romans gave the ſame denomination to the ſlaves who were intruſted with the care and inſtruction of their children.

PEDANT, a ſchool-maſter, or pedagogue, who profeſſes to inſtruct and govern youth, teach them the humanities, and the arts. See PEDAGOGUE.

PEDANT is alſo uſed for a rough, unpoliſhed man of letters, who makes an impertinent uſe of the ſciences, and abounds in unſeaſonable criticiſms and obſervations.

Dacier defines a pedant, a perſon who has more reading than good ſenſe. See PEDANTRY.

Pedants are people ever armed with quibbles and ſyllogiſms; breathe nothing but diſputation and chicanry, and purſue a propoſition to the laſt limits of logic.

Malebranche deſcribes a pedant as a man full of falſe erudition, who makes a parade of his knowledge, and is ever quoting ſome Greek or Latin author, or hunting back to a remote etymology.

St Evremont ſays, that to paint the folly of a pedant, we muſt repreſent him as turning all converſation to ſome one ſcience or ſubject he is beſt acquainted withal.

There are pedants of all conditions, and all robes. Wicquefort ſays, an ambaſſador, always attentive to formalities and decorums, is nothing elſe but a political pedant.

PEDANTRY, or PEDANTISM, the quality or manner of a pedant. See PEDANT.

To ſwell up little and low things, to make a vain ſhow of ſcience, to heap up Greek and Latin without judgment, to tear thoſe to pieces who differ from us about a paſſage in Suetonius or the etymology of a word, to ſtir up all the world againſt a man for not admiring Cicero enough, to be intereſted for the reputation of an ancient as if he were our next of kin, is what we properly call *pedantry*.

PEDARIAN, in Roman antiquity, thoſe ſenators who ſignified their votes by their feet, not their tongues; that is, ſuch as walked over to the ſide of thoſe whoſe opinion they approved of, in diviſions of the houſe.

PEDERASTS, the ſame with SODOMITES.

PEDESTAL, in architecture, the loweſt part of an order of columns, being that part which ſuſtains the column, and ſerves it as a foot or ſtand. See Column.

PEDICLE, among botaniſts, that part of a ſtalk which immediately ſuſtains the leaf of a flower or a fruit, and is commonly called a *footſtalk*.

PEDICULUS, the Louse, in zoology, a genus of inſects belonging to the order of aptera. It has ſix feet, two eyes, and a ſort of ſting in the mouth; the feelers are as long as the thorax; and the belly is depreſſed and ſublobated.

Many animals both of the quadruped and flying kinds are ſubject to lice; but theſe are of peculiar ſpecies on each animal, and are not at all like thoſe which infeſt the human body. Nay, even inſects are infeſted with vermin which feed on and torment them. Several kinds of beetles are ſubject to lice; but particularly that kind called thence the *louſy beetle*. The lice on this are very numerous, and will not be ſhook off. The earwig is often infeſted with lice, juſt at the ſetting on of its head: theſe are white, and ſhining like mites, but they are much ſmaller; they are round-backed, flat bellied, and have long legs, particularly the foremoſt pair. Snails of all kinds, but eſpecially the large naked ſorts, are very ſubject to lice; which are continually ſeen running about them, and devouring them. Numbers of little red lice, with a very ſmall head, and in ſhape reſembling a tortoiſe, are often ſeen about the legs of ſpiders, and they never leave the animal while he lives; but if he is killed, they almoſt inſtantly forſake him. A ſort of whitiſh lice is found on humble-bees: they are alſo found upon ants; and fiſhes are not leſs ſubject to them than other animals.

Kircher tells us, that he found lice alſo on flies, and M. de la Hire has given a curious account of the creature which he found on the common fly. Having occaſion to view a living fly with the microſcope, he obſerved on its head, back, and ſhoulders, a great number of ſmall animals crawling very nimbly about, and often climbing up the hairs which grow at the origin of the fly's legs. He with a fine needle took up one of theſe, and placed it before the microſcope uſed to view the animalcules in fluids. It had eight legs; four on each ſide. Theſe were not placed very diſtant from each other; but the four towards the head were ſeparated by a ſmall ſpace from the four towards the tail. The feet were of a particular ſtructure, being compoſed of ſeveral fingers, as it were, and fitted for taking faſt hold of any thing; but the two neareſt the head were alſo more remarkable in this particular than thoſe near the tail; the extremities of the legs for a little way above the feet were dry and void of fleſh like the legs of birds, but above this part they appeared plump and fleſhy. It had two ſmall horns upon its head, formed of ſeveral hairs arranged cloſely together; and there were ſome other cluſters of hairs by the ſide of theſe horns, but they had not the ſame figure; and towards the origin of the hinder legs there were two other ſuch cluſters of hairs which took their origin at the middle of the back. The whole creature was of a bright yellowiſh red; the legs, and all the body, except a large ſpot in the centre, were perfectly tranſparent. In ſize, he computed it to be about $\frac{1}{1000}$th part of the head of the fly; and he obſerves, that ſuch kind of vermin are rarely found on flies.

The louſe which infeſts the human body makes a very curious appearance through a microſcope. It has ſuch a tranſparent ſhell or ſkin, that we are able to diſcover more of what paſſes within its body than in moſt other living creatures. It has naturally three diviſions, the head, the breaſt, and the tail part. In the head appear two fine black eyes, with a horn that has five joints, and is ſurrounded with hairs ſtanding before each eye; and from the end of the noſe or ſnout there is a pointed projecting part, which ſerves as a ſheath or caſe to a piercer or ſucker, which the creature thruſts into the ſkin to draw out the blood and humours which are its deſtined food; for it has no mouth that opens in the common way. This piercer or ſucker is judged to be 700 times ſmaller than a hair, and is contained in another caſe within the firſt, and can be drawn in or thruſt out at pleaſure. The breaſt is very beautifully marked in the middle; the ſkin is tranſparent, and full of little pits; and from the under part of it proceed ſix legs, each having five joints, and their ſkin all the way reſembling ſhagreen, except at the ends where it is ſmoother. Each leg is terminated by two claws, which are hooked, and are of an unequal length and ſize. Theſe it uſes as we would a thumb and middle finger; and there are hairs between theſe claws as well as all over the legs. On the back part of the tail there may be diſcovered ſome ring-like diviſions, and a ſort of marks which look like the ſtrokes of a rod on the human ſkin; the belly looks like ſhagreen, and towards the lower end it is very clear, and full of pits: at the extremity of the tail there are two ſemicircular parts all covered over with hairs, which ſerve to conceal the anus. When the louſe moves its legs, the motion of the muſcles, which all unite in an oblong dark ſpot in the middle of the breaſt, may be diſtinguiſhed perfectly, and ſo may the motion of the muſcles of the head when it moves its horns. We may likewiſe ſee the various ramifications of the veins and arteries, which are white, with the pulſe regularly beating in the arteries. But the moſt ſurpriſing of all the ſights is the periſtaltic motion of the guts, which is continued all the way from the ſtomach down to the anus.

If one of theſe creatures, when hungry, be placed on the back of the hand, it will thruſt its ſucker into the ſkin, and the blood which it ſucks may be ſeen paſſing in a fine ſtream to the fore-part of the head; where, falling into a roundiſh cavity, it paſſes again in a fine ſtream to another circular receptacle in the middle of the head; from thence it runs thro' a ſmall veſſel to the breaſt, and then to a gut which reaches to the hinder part of the body, where in a curve it turns again a little upward; in the breaſt and gut the blood is moved without intermiſſion, with a great force; eſpecially in the gut, where it occaſions ſuch a contraction of the gut as is very ſurpriſing. In the upper part of the crooked aſcending gut above-mentioned, the propelled blood ſtands ſtill, and ſeems to undergo a ſeparation, ſome of it becoming clear and wateriſh, while other black particles are puſhed forward to the anus. If a louſe is placed on its back, two bloody darkiſh ſpots appear; the larger in the middle of the body, the leſſer towards the tail; the motions of which are followed by the pulſation of the dark bloody ſpot, in or over which the white bladder

Pediculus.

ſeems to lie. This motion of the ſyſtole and diaſtole is beſt ſeen when the creature begins to grow weak; and on pricking the white bladder, which ſeems to be the heart, the creature inſtantly dies. The lower dark ſpot is ſuppoſed to be the excrement in the gut.

Lice have been ſuppoſed to be hermaphrodites: but this is erroneous; for Mr Lieuwenhoeck obſerved, that the males have ſtings in their tails, which the females have not. And he ſuppoſes the ſmarting pain, which thoſe creatures ſometimes give, to be owing to their ſtinging with theſe ſtings when made uneaſy by preſſure or otherwiſe. He ſays, that he felt little or no pain from their ſuckers, though ſix of them were feeding on his hand at once.

In order to know the true hiſtory and manner of breeding of theſe creatures, Mr Lieuwenhoeck put two female lice into a black ſtocking, which he wore night and day. He found on examination that, in ſix days one of them had laid above 50 eggs; and, upon diſſecting it, he found as many yet remaining in the ovary: whence he concludes, that in 12 days it would have laid 100 eggs. Theſe eggs naturally hatch in ſix days, and would then probably have produced 50 males, and as many females; and theſe females coming to their full growth in 18 days, might each of them be ſuppoſed after 12 days more to lay 100 eggs; which eggs, in ſix days more, might produce a young brood of 5000; ſo that in eight weeks, one louſe may ſee 5000 of its own deſcendents.

Signior Rhedi, who has more attentively obſerved theſe animals than any other author, has given ſeveral engravings of the different ſpecies of lice found on different animals. Men, he obſerves, are ſubject to two kinds; the common louſe, and the crab-louſe. He obſerves alſo, that the ſize of the lice is not at all proportioned to that of the animal which they infeſt; ſince the ſtarling has them as large as the ſwan.

Some kinds of conſtitutions are more apt to breed lice than others; and in ſome places of different degrees of heat, they are certain to be deſtroyed upon people who in other climates are over-run with them. It is an obſervation of Oviedo, that the Spaniſh ſailors, who are generally much afflicted with lice, always loſe them in a certain degree of latitude in their voyage to the Eaſt Indies, and have them again on their returning to the ſame degree. This is not only true of the Spaniards, but of all other people who make the ſame voyage; for though they ſet out ever ſo louſy, they have not one of thoſe creatures by the time they come to the tropic. And in the Indies there is no ſuch thing as a louſe about the body, though the people be ever ſo naſty. The ſailors continue free from theſe creatures till their return; but in going back, they uſually begin to be louſy after they arrive at the latitude of the Madeira iſlands. The extreme ſweats, which the working people naturally fall into, between the latitude of Madeira and the Indies, drown and deſtroy the lice; and have the ſame effect as the rubbing over the louſy heads of children with butter and oil. The ſweat, in theſe hot climates, is not rank as in Europe, and therefore it is not apt to breed lice; but where people return into latitudes where they ſweat rank again, their naſtineſs ſubjects them to the ſame viſitations of theſe vermin as before. The people in general in the Indies are very ſubject to lice in their heads, tho' free from them on their bodies. The reaſon of this is, that their heads ſweat leſs than their bodies, and they take no care to comb and clean them. The Spaniſh negroes waſh their heads thoroughly once every week with ſoap, to prevent their being louſy. The makes them eſcape much better than the other negroes who are ſlaves there; for the lice grow ſo numerous in their heads, that they often eat large holes in them.

Pediluvi

PEDILUVIUM, or Bathing *of the* Feet. The uſes of warm bathing in general, and of the pediluvium in particular, are ſo little underſtood, that they are often prepoſterouſly uſed, and ſometimes as injudiciouſly abſtained from.

In the Edinburgh medical eſſays, we find an ingenious author's opinion of the warm pediluvium, notwithſtanding that of Borelli, Boerhaave, and Hoffman, to the contrary, to be, That, the legs becoming warmer than before, the blood in them is warmed: this blood rarefying, diſtends the veſſels; and in circulating imparts a great degree of warmth to the reſt of the maſs; and as there is a portion of it conſtantly paſſing through the legs, and acquiring new heat there, which heat is in the courſe of circulation communicated to the reſt of the blood, the whole maſs rarefying, occupies a larger ſpace, and of conſequence circulates with greater force. The volume of the blood being thus increaſed, every veſſel is diſtended, and every part of the body feels the effects of it; the diſtant parts a little later than thoſe firſt heated. The benefit obtained by a warm pediluvium is generally attributed to its making a derivation into the parts immerſed, and a revulſion from thoſe affected, becauſe they are relieved; but the cure is performed by the direct contrary method of operating, viz. by a greater force of circulation through the parts affected, removing what was ſtagnant or moving too ſluggiſhly there. Warm bathing is of no ſervice where there is an irreſoluble obſtruction, though, by its taking off from a ſpaſm in general, it may ſeem to give a moment's eaſe: nor does it draw from the diſtant parts, but often hurts by puſhing againſt matter that will not yield with a ſtronger impetus of circulation than the ſtretched and diſeaſed veſſels can bear: ſo that where there is any ſuſpicion of ſcirrhus, warm bathing of any ſort ſhould never be uſed. On the other hand, where obſtructions are not of long ſtanding, and the impacted matter is not obſtinate, warm baths may be of great uſe to reſolve them quickly. In recent colds, with ſlight humoral peripneumonies, they are frequently an immediate cure. This they effect by increaſing the force of the circulation, opening the ſkin, and driving freely through the lungs that lentor which ſtagnated or moved ſlowly in them. As thus conducing to the reſolution of obſtructions, they may be conſidered as ſhort and ſafe fevers; and in uſing them we imitate nature, which by a fever often carries off an obſtructing cauſe of a chronical ailment. Borelli, Boerhaave, and Hoffman, are all of opinion, that the warm pediluvium acts by deriving a larger quantity of blood into the parts immerſed. But arguments muſt give way to facts: the experiments related in the Medical Eſſays ſeem to prove to a demonſtration, that the warm pediluvium acts by rarifying the blood.

A warm pediluvium, when rightly tempered, may be uſed as a ſafe cordial, by which circulation can be rouſed, or a gentle fever raiſed; with this advantage over the cordials and ſudorifics, that the effect of them may be taken off at pleaſure.

Pediluvia are ſometimes uſed in the ſmall-pox; but Dr Stevenſon thinks their frequent tumultuous operations render that ſuſpected, and at beſt of very doubtful effect; and he therefore prefers Monſ. Martin of Lauſanne's method of bathing the ſkin, not only of the legs, but of the whole body, with a ſoft cloth dipped in warm water, every four hours, till the eruption; by which means the puſtules may become univerſally higher, and conſequently more ſafe.

PEDIMENT. See ARCHITECTURE, n° 77.

PEDLAR, a travelling foot-trader. See HAWKER.

Among the Britiſh and French the pedlars are deſpiſed; but it is otherwiſe in certain countries. In Spaniſh America, the buſineſs is ſo profitable, that it is thought by no means diſhonourable; and there are many gentlemen in Old Spain, who, when their circumſtances are declining, ſend their ſons to the Indies to retrieve their fortunes in this way. Almoſt all the commodities of Europe are diſtributed through the ſouthern continent of America by means of theſe pedlars. They come from Panama to Paita by ſea; and in the road from the port laſt mentioned, they make Peura their firſt voyage to Lima. Some take the road through Caxamalia; others through Truxillo, along ſhore from Lima. They take their paſſage back to Panama by ſea, and perhaps take with them a little cargo of brandy. At Panama they again ſtock themſelves with European goods, returning by ſea to Paita, where they are put on ſhore; there they hire mules and load them, the Indians going with them in order to lead them back. Their travelling expences are next to nothing; for the Indians are brought under ſuch ſubjection, that they find lodging for them, and provender for their mules, frequently thinking it an honour done them for their gueſts to accept of this for nothing, unleſs the ſtranger now and then, out of generoſity or compaſſion, makes a ſmall recompence.

In Poland, where there are few or no manufactures, almoſt all the merchandiſe is carried on by pedlars, who are ſaid to be generally Scotſmen, and who, in the reign of king Charles II. are ſaid to have amounted to no fewer than 53,000.

PEDUNCLE, in botany. See PEDICLE.

PEEBLES, or TWEEDALE, a county of Scotland, extending 25 miles in length, and 18 in breadth. It is bounded on the eaſt by Ettrick Foreſt, on the ſouth by Annandale, on the weſt by Clydeſdale, and on the north by Mid Lothian. Tweedale is a hilly country, well watered with the Tweed, the Yarrow, and a great number of ſmaller ſtreams that fertilize the valleys, which produce good harveſts of oats and barley, with ſome proportion of wheat. All the rivers of any conſequence abound with trout and ſalmon. The lake called *Weſt-Water Loch* ſwarms with a prodigious number of eels. In the month of Auguſt, when the weſt wind blows, they tumble into the river Yarrow in ſuch ſhoals, that the people who wade in to catch them run the riſk of being overturned. There is another lake on the borders of Annandale, called *Lochgennen*, which forms a cataract over a precipice 250 paces high: here the water falls with ſuch a momentum as to kill the fiſh underneath. About the middle of this country is the hill or mountain of Braidalb, from the top of which the ſea may be ſeen on each ſide of the iſland. Tweedale abounds with limeſtone and freeſtone. The hills are generally as green as the downs in Suſſex, and feed innumerable flocks of ſheep, that yield great quantities of excellent wool. The country is well ſhaded with woods and plantations, abounds with all the neceſſaries of life, and is adorned with many fine ſeats and populous villages. The earls of March were hereditary ſheriffs of Tweedale, which beſtows the title of *marquis* on a branch of the ancient houſe of Hay, earls of Errol, and hereditary high conſtables of Scotland. The family of Tweedale is, by the female ſide, deſcended from the famous Simon de Fraſer, proprietor of great part of this country, who had a great ſhare in obtaining the triple victory at Roſlin. The chief, and indeed the only town of conſequence in Tweedale, is PEEBLES, a ſmall inconſiderable royal borough, and ſeat of a preſbytery, pleaſantly ſituated on the banks of the Tweed, over which there is at this place a ſtately ſtone bridge of five arches. In the neighbourhood of Peebles, near the village of Romana, on the river Lene, we ſee the veſtiges of two Roman caſtella, or ſtationary forts; and a great many terraces on the neighbouring hills, which perhaps have ſerved as itinerary encampments. In the ſhire of Tweedale there are many ancient and honourable families of the gentry. Among theſe, Douglas of Cavers, who was hereditary ſheriff of the county, ſtill preſerves the ſtandard and the iron mace of the gallant lord Douglas, who fell in the battle of Otterburn, juſt as his troops had defeated and taken Henry Percy, ſurnamed *Hotſpur*. In the church-yard of Drumelzier, belonging to an ancient branch of the Hay-family, the famous Merlin is ſuppoſed to lie buried. There was an old traditional prophecy, that the two kingdoms ſhould be united, when the waters of the Tweed and the Panſel ſhould meet at his grave. Accordingly, the country people obſerve that this meeting happened in conſequence of an inundation at the acceſſion of James VI. to the crown of England.

PEEK, in the ſea-language, is a word uſed in various ſenſes. Thus the anchor is ſaid to be a-peek, when the ſhip being about to weigh comes over her anchor in ſuch a manner that the cable hangs perpendicularly between the hauſe and the anchor.

To have a-peek is to bring the peek ſo as that the anchor may hang a-peek. A ſhip is ſaid to ride a-peek, when lying with her main and fore yards hoiſted up, one end of her yards is brought down to the ſhrouds, and the other raiſed up an end; which is chiefly done when ſhe lies in rivers, leſt other ſhips falling foul of the yards ſhould break them. Riding a-broad peek, denotes much the ſame, excepting that the yards are only raiſed to half the height.

Peek is alſo uſed for a room in the hold, extending from the bitts forward to the ſtem: in this room men of war keep their powder, and merchant-men their victuals.

PEER, in general, ſignifies an equal, or one of the ſame rank and ſtation: hence in the acts of ſome councils,

cils, we find theſe words, *with the conſent of our peers, biſhops, abbots*, &c. Afterwards the ſame term was applied to the vaſſals or tenants of the ſame lord, who were called *peers*, becauſe they were all equal in condition, and obliged to ſerve and attend him in his courts; and peers *in fiefs*, becauſe they all held fiefs of the ſame lord.

The term *peers* is now applied to thoſe who are impannelled in an inqueſt upon a perſon for convicting or acquitting him of any offence laid to his charge: and the reaſon why the jury is ſo called, is becauſe by the common law and the cuſtom of this kingdom, every perſon is to be tried by his peers or equals; a lord by the lords, and a commoner by commoners. See the article Jury.

Peer *of the Realm*, a noble lord who has a ſeat and vote in the Houſe of Lords, which is alſo called the *Houſe of Peers*.

Theſe lords are called *peers*, becauſe though there is a diſtinction of degrees in our nobility, yet in public actions they are equal, as in their votes in parliament, and in trying any nobleman or other perſon impeached by the commons, &c. See Parliament.

Houſe of Peers, or *Houſe of Lords*, forms one of the three eſtates of parliament. See Lords and Parliament.

In a judicative capacity, the houſe of peers is the ſupreme court of the kingdom, having at preſent no original juriſdiction over cauſes, but only upon appeals and writs of error; to rectify any injuſtice or miſtake of the law committed by the courts below. To this authority they ſucceeded of courſe upon the diſſolution of the *Aula Regia*. For as the barons of parliament were conſtituent members of that court, and the reſt of its juriſdiction was dealt out to other tribunals, over which the great officers who accompanied thoſe barons were reſpectively delegated to preſide, it followed, that the right of receiving appeals, and ſuperintending all other juriſdictions, ſtill remained in that noble aſſembly, from which every other great court was derived. They are therefore in all caſes the laſt reſort, from whoſe judgment no farther appeal is permitted; but every ſubordinate tribunal muſt conform to their determinations: The law repoſing an entire confidence in the honour and conſcience of the noble perſons who compoſe this important aſſembly, that they will make themſelves maſters of thoſe queſtions upon which they undertake to decide; ſince upon their deciſion all property muſt finally depend. See Lords.

Peers *of France*, are twelve great lords of that kingdom; of which ſix are dukes and ſix counts; and of theſe, ſix are eccleſiaſtics and ſix laymen: thus the archbiſhop of Rheims, and the biſhop of Laon and Langres, are dukes and peers; and the biſhops of Chalon on the Marn, Noyons, and Beauvais, are counts and peers. The dukes of Burgundy, Normandy, and Aquitain, are lay peers and dukes; and the counts of Flanders, Champaign, and Toulouſe, lay peers and counts. Theſe peers ſtill aſſiſt at the coronation of kings, either in perſon or by their repreſentatives, where each performs the functions attached to his reſpective dignity: but as the ſix lay peerages are all at preſent united to the crown, except that of the count of Flanders, ſix lords of the firſt quality are choſen to repreſent them: but the eccleſiaſtical peers uſually aſſiſt in perſon. At preſent the title of peer is beſtowed on every lord whoſe eſtate is erected into a peerage; the number of which is uncertain, as it depends entirely on the king.

PEERESS, a woman who is noble by deſcent, creation, or marriage.

If a peereſs, by deſcent or creation, marries a perſon under the degree of nobility, ſhe ſtill continues noble: but if ſhe obtains that dignity only by marriage, ſhe loſes it, on her afterwards marrying a commoner; yet by the curteſy of England, ſhe always retains the title of her nobility.

PEWIT, in ornithology. See Larus.

PEGASUS, among the poets, a horſe imagined to have wings; being that whereon Bellerophon was fabled to be mounted when he engaged the chimera. See Chimera.

The opening of the fountain Hippocrene on mount Helicon, is aſcribed to a blow of Pegaſus's hoof. It was feigned to have flown away to heaven, where it became a conſtellation. Hence

Pegasus, in aſtronomy, the name of a conſtellation of the northern hemiſphere, in form of a flying horſe. See Astronomy, nº 206.

PEGU, a very conſiderable kingdom of Aſia, beyond the Ganges. The country properly ſo called is but about 350 miles in length from north to ſouth, and as much in breadth from eaſt to weſt. It is bounded, on the north by the kingdoms of Arrakan and Ava; on the eaſt, by the Upper and Lower Siam; on the ſouth, by part of Siam and the ſea; and on the weſt, by the ſea and part of Arrakan. Conſidered in a larger ſenſe however, as augmented by the conqueſts of its Barma kings, it extends as far north as the province of Yunan in China, comprehending almoſt all the farther peninſula of India.

The kingdom of Pegu is ſaid to have been founded about 1100 years ago. Its firſt king was a ſeaman; concerning whom and his ſucceſſors we know nothing till the diſcovery of the Eaſt Indies by the Portugueſe in the beginning of the 16th century. In 1518 the throne of Pegu was poſſeſſed by one Breſſagukan, with whom Antony Correa the Portugueſe ambaſſador ſolemnly concluded a peace in 1519. This monarch was poſſeſſed of a very large and rich empire, nine kingdoms being in ſubjection to him, whoſe revenues amounted to three millions of gold. We hear no farther account of his tranſactions after the concluſion of the treaty with the Portugueſe. In 1539 he was murdered on the following occaſion: Among other princes who were his tributaries was Para Mandera, king of the Barmas. Theſe people inhabited the high lands called *Pangavirau*, to the northward of the kingdom of Pegu. Their prince, by one of the terms of his vaſſalage, was obliged to furniſh the king of Pegu with 30,000 Barmas, to labour in his mines and other public works. As the king uſed frequently to go and ſee how his works went forward, and in theſe journeys took along with him none but his women, the Barmas obſerving theſe viſits frequently repeated, formed a deſign of robbing the queen and all the concubines of of their jewels; and purſuant to this deſign, the next time the king viſited the works, they murdered him, and having ſtripped the ladies fled to their own country.

By this enormity all Pegu was thrown into confuſion: but, inſtead of revenging the death of their king, the people divided every where into factions; ſo that Dacha Rupi, the lawful heir to the crown, found himſelf unable to maintain his authority. Of theſe commotions, the king of the Barmas taking the advantage, not only ſhook off the yoke, but formed a deſign of conquering the kingdom of Pegu itſelf. With this view he invaded the country with an army of more than a million of foot, and 5000 elephants; beſides a great fleet which he ſent down the river Ava towards Bagou, or Pegu, the capital of the empire; while he himſelf marched thither by land. Juſt at this time Ferdinand de Mirales arrived at Pegu from Goa with a large galleon richly laden on account of the king of Portugal. As ſoon as Dacha Rupi heard of his coming, he ſent to deſire his aſſiſtance againſt the enemy. This he obtained by great preſents and promiſes: and Mirales, ſetting out in a galliot, joined the king's ſhips. Had the numbers been any thing near an equality, the ſuperior ſkill of Mirales would undoubtedly have gained the victory: But the fleet of the Barmas covered the whole river though as large as the Ganges, while that of Dacha Rupi could ſcarce be obſerved in compariſon with them. Mirales did every thing that man could do, and even held out alone after the natives had deſerted him; but at laſt, oppreſſed and overwhelmed with numbers, he was killed, with all his men.

Thus Para Mandara became maſter of all Pegu; after which he attacked the tributary kingdoms. In 1544 he beſieged Martavan, the capital of a kingdom of the ſame name, then very great and flouriſhing. The land-forces which he brought againſt it conſiſted of 700,000 men, while by ſea he attacked it with a fleet of 1700 ſail; 100 of which were large galleys, and in them 700 Portugueſe commanded by John Cayero, who had the reputation of being a valiant and experienced officer. The ſiege, however, continued ſeven months, during which time the Barmas loſt 120,000 men; but at laſt the beſieged king, finding himſelf ſtraitened for want of proviſions, and unable to withſtand ſo great a power, offered terms of capitulation. The beſiegers would admit of no terms, upon which the diſtreſſed king applied to the Portugueſe in the ſervice of his enemy; for by their aſſiſtance he doubted not to be able to drive away the Barmas. Accordingly he ſent one Seixas to Cayero, intreating him to received himſelf, his family, and treaſure, on board the four ſhips he had under his command; offering, on that condition, to give half his riches to the king of Portugal, to become his vaſſal, and pay ſuch tribute as ſhould be agreed upon. Cayero conſulted the principal officers, and in their preſence aſked Seixas what he thought the treaſure might amount to. Seixas anſwered, that out of what he had ſeen, for he had not ſeen all, two ſhips might be loaded with gold, and four or five with ſilver. This propoſal was too advantageous to be ſlighted; but the reſt of the officers envying the great fortune which Cayero would make, threatened to diſcover the whole to the king of Barma if he did not reject it. The unhappy king of Martavan had now no other reſource but to ſet fire to the city, make a ſally, and die honourably with the few men he had with him: but even here he was diſappointed; for by the deſertion of 4000 of his troops the enemy were appriſed of his deſign, and prevented it. Thus betrayed, he capitulated with the Barma king for his own life and the lives of his wife and children, with leave to end his days in retirement. All this was readily granted, but the conqueror intended to perform no part of his promiſe. The city was plundered and burnt, by which above 60,000 perſons periſhed, while at leaſt an equal number were carried into ſlavery. Six thouſand cannon were found in the place; 100,000 quintals of pepper, and an equal quantity of other ſpices. The day after this deſtruction, 21 gibbets were erected on an hill adjoining to the city; on which the queen, her children and ladies, were executed, by hanging them up alive by the feet: however, the queen expired with anguiſh before ſhe ſuffered ſuch a cruel indignity. The king, with 50 of his chief lords, was caſt into the ſea, with ſtones about their necks. This monſtrous cruelty ſo provoked the tyrant's ſoldiers, that they mutined, and he was in no ſmall danger of ſuffering for it: however, he found means to pacify them; after which he proceeded to beſiege Prom, the capital of another kingdom. Here he increaſed his army to 900,000 men. The queen by whom it was governed offered to ſubmit to be his vaſſal; but nothing would ſatiſfy the Barma monarch leſs than her ſurrender at diſcretion, and putting all her treaſure into his hands. This ſhe, who knew his perfidy, refuſed to do; on which the city was fiercely aſſaulted, but greatly to the diſadvantage of the Barmas, who loſt near 100,000 men. However, the city was at laſt betrayed to him, when Mandara behaved with his uſual cruelty. Two thouſand children were ſlain, and their bodies cut in pieces and thrown to the elephants; the queen was ſtripped naked, publicly whipped, and then tortured till ſhe died; the young king was tied to her dead body, and both together caſt into a river, as were alſo 300 other people of quality.

While the tyrant was employed in fortifying the city, he was informed, that the prince of Ava had ſailed down the river Queytor with 400 rowing veſſels having 30,000 ſoldiers on board; but that, hearing of the queen's diſaſter, he ſtoped at Meletay a ſtrong fortreſs about 12 leagues north of Prom, where he waited to be joined by his father the king of Ava with 80,000 men. On this news the Barma king ſent his foſter-brother Chaumigrem along the river-ſide with 200,000 men, while he himſelf followed with 100,000 more. The prince in this emergency burnt his barks, forming a vanguard of the mariners; and, putting his ſmall army in the beſt poſition he could, expected the enemy. A moſt deſperate engagement enſued, in which only 800 of the prince's army were left, and 115,000 out of 200,000 Barmas who oppoſed him were killed. The 800 Avans retired into the fort: but Mandara coming up ſoon after, and being enraged at the terrible havock made in his army, attacked the fortreſs moſt violently for ſeven days; at the end of which time, the 800, finding themſelves unable to hold out any longer, ruſhed out in a dark and rainy night, in order to ſell their lives at as dear a rate as poſſible. This laſt effort was ſo extremely violent, that they broke through the enemy's troops in ſeveral places, and even preſſed ſo hard on the king himſelf that he was forced to jump into the river. However, they were at laſt all cut off, but not before they had deſtroyed 12,000 of their enemies.

Mandara having thus become maſter of the fort, commanded it to be immediately repaired; and ſailed up the river to the port of Ava, about a league from the capital, where he burnt between 2000 and 3000 veſſels, and loſt in the interpriſe about 8000 men. The city itſelf he did not think proper to inveſt, as it had been newly fortified, was defended by a numerous garriſon, and an army of 80,000 men was advancing to its relief. The king alſo, apprehenſive of Mandara's power, had implored the protection of the emperor Siam; offering to become his tributary on condition that he would aſſiſt him with his forces in recovering the city of Prom. To this the emperor readily aſſented; which news greatly alarmed the Barma monarch, ſo that he diſpatched ambaſſadors to the Kalaminham or ſovereign of a large territory adjacent, requeſting him to divert the emperor from his purpoſe. On the ambaſſadors return from this court it appeared that the treaty had already taken effect; but as the ſeaſon was not yet arrived for invading Ava, Chaumigren the king's foſter-brother was ſent with 150,000 men to reduce Sebadi or Savadi the capital of a ſmall kingdom about 130 leagues north-eaſt from Pagu. The general, however, failed in his attempt; and afterwards endeavouring to revenge himſelf on a town in the neighbourhood, he was ſurpriſed by the enemy and put to flight.

In the mean time the empire of Siam fell into great diſtractions; the king together with the heir to the crown were murdered by the queen, who had fallen in love with an officer, whom ſhe married after her huſband's death. However, both of them were ſoon after killed at an entertainment; and the crown was given to a natural brother of the late king, but a coward and a tyrant. On this Mandara reſolved to invade the country; and, his principal courtiers concurring in the ſcheme, he collected an army of 800,000 men, with no fewer than 20,000 elephants. In this army were 1000 Portugueſe, commanded by one James Suarez, who already had a penſion of 200,000 ducats a-year from the king of Pegu, with the title of his brother, and governor of the kingdom. With this formidable army he ſet out in April 1548. His firſt atchievement was the taking of a fortreſs on the borders of the enemy's country; before which, being ſeveral times repulſed, and having loſt 3000 of his men, he revenged himſelf by putting all the women to the ſword. He next beſieged the capital of itſelf; but though the ſiege was continued for five months, during which time the moſt violent attacks were made upon it, the aſſailants were conſtantly repulſed with great loſs. However, it was ſtill reſolved to continue the ſiege; and a mount of earth was raiſed, on which were placed 40 pieces of cannon ready to batter it anew, when, in October, advice was received of a rebellion having broke out in Pegu.

The perſon who headed the rebels on the preſent occaſion was Shoripam Shay, near akin to the former monarch ſlain twelve years before. He was a religious perſon, of great underſtanding, and eſteemed a ſaint. As he was a famous preacher, he made a ſermon, in which he ſet forth the tyranny of the Barmas in ſuch a manner, that he was immediately taken out of the pulpit and proclaimed king by the people, who, as a token of ſovereignty, gave him the title of *Shemindoo*. The firſt act of ſovereignty which he exerted was to cut in pieces 15,000 Barmas, and ſeize on the treaſure: and ſo agreeable was this change of government to all ranks of people, that in three weeks time all the ſtrong-holds of Pegu fell into his hands.

On this news the king immediately raiſed the ſiege in which he was engaged, and in 17 days got to Martavan. Here he was informed, that Shemindoo had poſted 590,000 men in different places, in order to intercept his paſſage; at the ſame time that he had the mortification to find 50,000 of his beſt troops deſerted. To prevent a greater deſertion, after 14 days ſtay, he departed from Martavan, and ſoon met Shemindoo at the head of 600,000 men. A deſperate engagement followed; in which Shemindoo was entirely defeated, with the loſs of 300,000 men. Of the Barma troops were ſlain 60,000; among whom were 280 Portugueſe.

The morning after this victory, the tyrant marched to the city; the inhabitants of which ſurrendered, on condition of having their lives and effects ſpared. The kingdom being thus again brought under his ſubjection, his next ſtep was to puniſh the principal perſons concerned in the rebellion: their heads he cut off; and confiſcated their eſtates, which amounted to no leſs than ten millions of gold. Others ſay, that he put all without diſtinction to the ſword, excepting only 12,000, who took ſhelter in James Suarez's houſe; that alone affording an aſylum from the general ſlaughter. The plunder was incredible, Suarez alone getting three millions. All theſe cruelties, however, were inſufficient to ſecure the allegiance of the tyrant's ſubjects: for in leſs than three months news was brought that the city of Martavan had revolted; and that the governor had not only declared for Shemindoo, but murdered 2000 Barmas. Mandara then ſummoned all the lords of the kingdom to meet him with their force, within 15 days, at a place called *Mouchau*, not far from his capital, whither he himſelf went with 300 men, to wait their arrival. But in the mean time he received intelligence that the ſhemin or governor of Zatan, a city of ſome conſequence, had ſubmitted to Shemindoo, and alſo lent him a large ſum of gold. The ſhemin was immediately ſent for in order to be put to death: but he, ſuſpecting Mandara's deſign, excuſed himſelf by pretending ſickneſs; after which, having conſulted with his friends, he drew together about 600 men; and having with theſe privately advanced to the place where the king was, he killed him, with the few attendants that were about him at the time. The guards in the court being alarmed with the noiſe, a ſkirmiſh enſued with the ſhemin's men, in which about 800 were ſlain on both ſides, moſt of them Barmas. The ſhemin then retreated to a place called *Pontel;* whither the people of the country, hearing of the death of the king, who was univerſally hated, reſorted to him. When he had aſſembled about 5000 men, he returned to ſeek the troops which the late king had with him; and finding them diſperſed in ſeveral places, eaſily killed them all. With the Barmas were ſlain 80 out of 300 Portugueſe. The remainder ſurrendered, with Suarez their leader; and were ſpared, on condition of their remaining in the ſervice of the ſhemin.

The ſhemin now finding his forces daily increaſe, aſſumed the title of king; and, to render himſelf the more popular, gave out, that he would exterminate the Barmas ſo effectually, as not to leave one in all the kingdom. It happened, however, that one of thoſe who were with the late king at the time he was murdered, eſcaped the general ſlaughter; and, ſwimming over the river, informed Chaumigrem of the king's death. He had with him 180,000 men, all of them natives of Pegu, excepting 30,000 Barmas. He knew very well, that if the natives had known that the king was dead, he and all his Barmas would have inſtantly been put to the ſword. Pretending therefore that he had received orders to put garriſons into ſeveral places, Chaumigrem diſpatched all the natives into different parts; and thus got rid of thoſe whom he had ſo much cauſe to fear. As ſoon as they were marched, he turned back upon the capital, and ſeized the king's treaſure, together with all the arms and ammunition. He then ſet fire to the magazines, arſenals, palace, ſome of whoſe apartments were cieled with gold, and 2000 rowing veſſels which were on the river. Then, deſtroying all the artillery, he fled with the 30,000 Barmas to his own country, being purſued in vain by the natives of Pegu.

Thus the ſhemin of Zatan was left in quiet poſſeſſion of the kingdom; but, by his repeated acts of tyranny and cruelty, he ſo diſguſted his ſubjects, that many fled to foreign countries, while others went over to Shemindoo, who began now to gather ſtrength again. In the mean time, James Suarez, the Portugueſe whom we have often mentioned, loſt his life by attempting to raviſh a young woman of diſtinction; the ſhemin being unable to protect him, and obliged to give him up to the mob, who ſtoned him to death. The ſhemin himſelf did not long ſurvive him; for, being grown intolerable by his oppreſſions, moſt of his followers abandoned him, and he was beſieged in his capital by Shemindoo with an army of 200,000 men, and ſoon after ſlain in a ſally: ſo that Shemindoo now ſeemed to be fully eſtabliſhed in the throne. But in the mean time Chaumigrem, the foſter-brother to the deceaſed king, hearing that Pegu was very ill provided with the means of defence, invaded the kingdom with an army of 300,000 men. Shemindoo met him with three times their number; but his men, being all natives of Pegu, were inferior in ſtrength, notwithſtanding their numbers, to the enemy. The conſequence was, that Shemindoo was defeated with prodigious ſlaughter, and Chaumigrem cauſed himſelf to be proclaimed king of Pegu. Shortly after, Shemindoo himſelf was taken; and, after being treated with the utmoſt of cruelty, was beheaded.

The hiſtory of Chaumigrem is very imperfect. However, we know that he was a very great conqueror, and not at all inferior in cruelty to his predeceſſors. He reduced the empire of Siam and Arrakan, and died in 1583; being ſucceeded by his ſon named *Pranjinoko*, then about 50 years of age. When this prince aſcended the throne, the kingdom of Pegu was in its greateſt height of grandeur; but by his tyranny and obſtinacy he loſt all that his father had gained. He died in 1599, and after his death the kingdom of Pegu became ſubject to Arrakan; nor have we any farther diſtinct hiſtory of it.

The air of Pegn is very healthy, and preſently recovers ſick ſtrangers. The ſoil alſo is very rich and fertile in corn, rice, fruit, and roots; being enriched by the inundations of the river Pegu, which are almoſt incredible, extending above 30 leagues beyond its channel. It produces alſo good timber of ſeveral kinds. The country abounds with elephants, buffaloes, goats, hogs, and other animals, particularly game; and deer is ſo plenty in September and October, that one may be bought for three or four pence: they are very fleſhy, but have no fat. There is ſtore of good poultry; the cocks are vaſtly large, and the hens very beautiful. As for fiſh, there are many ſorts, and well taſted. In Pegu are found mines, not only of gold, iron, tin, and lead, or rather a kind of copper, or mixture of copper and lead, but alſo of rubies, diamonds, and ſapphires. The rubies are the beſt in the world; but the diamonds are ſmall, and only found in the craws of poultry and pheaſants. Beſides, only one family has the privilge of ſelling them; and none dare open the ground to dig for them. The rubies are found in a mountain in the province of Kablan, or Kapelan, between the city of Pegu and the port of Sirian.

The inhabitants are of an olive, or rather a tawny complexion. The women are branded by ſome travellers, as having ſhook off all modeſty, on account of their expoſing ſome parts of their bodies which ought to be concealed from ſight. Some alſo tell us, that the men wear bells, which at a certain age, *viz.* 25 or 30, or, according to others, when they are capable of making uſe of women, are inſerted on each ſide the virile member between the ſkin and the fleſh, which is opened for that purpoſe, and healed in ſeven or eight days. The Peguers may be ranked among the moſt ſuperſtitious of all mankind. They maintain and worſhip crocodiles; and will drink nothing but the waters of the ditches where thoſe monſtrous animals harbour. By thus expoſing themſelves to the manifeſt hazard of their lives, they have frequently the misfortune to be devoured. They have five principal feſtivals in the year, called *ſapans*, which they celebrate with extraordinary magnificence. In one of them the king and queen make a pilgrimage about 12 leagues from the city, riding on a triumphal car, ſo richly adorned with jewels, that it may be ſaid without an hyperbole, that they carry about with them the value of a kingdom. This prince is extremely rich; and has in the chapel of his palace, idols of ineſtimable value, ſome of them being of maſſy gold and ſilver, and adorned with all ſorts of precious ſtones. The talapoins, or prieſts of this country, have no poſſeſſions; but ſuch is the reſpect paid them by the people, that they are never known to want. They preach to them every Monday, not to commit murder; to take from no perſon any thing belonging to him; to do no hurt; to give no offence; to avoid impurity and ſuperſtition; but above all, not to worſhip the devil: but theſe diſcourſes have no effect in the laſt reſpect. The people, attached to manicheiſm, believe, that all good comes from God, that the devil is the author of all the evil that happens to men; and that therefore they ought to worſhip him, that he may not afflict them. This is a common notion among the Indian idolaters.

The inhabitants of Pegu are accuſed by ſome authors with being ſlovenly in their houſes, and naſty in their diet, on account of their ſeaſoning their victuals with ſidol, a compoſition made of ſtinking fiſh, reduced to a conſiſtency like muſtard, ſo nauſeous and offenſive, that none but themſelves can endure the ſmell of it. Balbi ſays, he could ſooner bear the ſcent of ſtinking carrion; and yet with this they ſeaſon their rice, and other ſoups, inſtead of oil or butter. As they have no wheat in this country, their bread is rice made into cakes. Their common drink is water, or a liquor diſtilled from cocoat-nut water.

The men here, as in moſt eaſtern countries, buy their wives, or pay their parents a dowry for them. They have an odd cuſtom; which is to offer their daughters to ſtrangers, and hire them out for a time: ſome ſay they hire out their wives in the ſame manner. Theſe marriages for a term are well regulated, and often prove very beneficial to the occaſional huſband. Moſt of the foreigners who trade hither, marry a wife for the time of their ſtay. In caſe of a ſeparation, the father is obliged to take care of the boys, and the mother of the girls. We are told that no woman is looked upon the worſe, but rather the better, for having had ſeveral European huſbands: nay, we are told, that no perſon of faſhion in Pegu, from the gentleman to the king, will marry a maiden, till ſome acquaintance or ſtranger has had the firſt night's lodging with her.

In Pegu, the inheritance of all land is in the king: he is likewiſe the heir of all his ſubjects who die without iſſue; but in caſe they have children, two-thirds go to them, and the reſt to his majeſty.

When a perſon falls ſick, we are told that they generally make a vow to the devil, from whom they believe all evil comes. Then a ſcaffold is built, and victuals are ſpread on the top of it to ſolace Old Nic, and render him propitious. This feaſt is accompanied with lighted candles and muſic; and the whole is managed by an undertaker called the *devil's father*.

The commodities exported from this country are gold, ſilver, rubies, muſk, benjamin, long-pepper, tin, lead, copper; lakka, or gum-lac, whereof they make hard wax; rice; rice-wine; and ſome ſugar-canes, of which they would have plenty, but that the elephants eat them. It may be obſerved, that under the name of *rubies*, the Peguers compriſe topazes, ſapphires, amethyſts, and other ſtones; which they diſtinguiſh by ſaying the blue, the violet, and the yellow rubies. The true ruby is red, tranſparent, or ſparkling, inclining near the ſurface, to the violet of the amethyſt. Cotton cloths from Bengal and Coromandel, with ſome ſtriped ſilks, are beſt for the Pegu market, and ſilver of any ſort will go off there; for the king, in return for his eight and a half *per cent.* duty on it, allows the merchants to melt it down, and put what copper alloy they pleaſe in it. They wear none of our European commodities in Pegu but hats and ribbons. The gentry will give extravagant prices for fine beaver hats, which they wear without any cocks. They are no leſs fond of ribbons flowered with gold and ſilver, which they wear round their hats.

As to the religion of the Peguers, it is the ſame at bottom with that which prevails over the reſt of India and Tibet; only varies in dreſs ſomewhat in different countries, according to the humour or intereſt of the prieſts. They hold the exiſtence of one ſupreme God, of whom they make no image; but they have many inferior created gods, whoſe images are ſet up in the temples for the laity to worſhip. Not content with theſe, we are told they worſhip the devil alſo. Many are ſeen to run about the ſtreets every morning, with rice in one hand and a torch in the other, crying aloud, that they are going to give the devil his breakfaſt, that he may not hurt them all the day. Beſides the manichean doctrine of two principles, one the author of good, and the other of evil, from whence their worſhipping the devil has its riſe, they believe an eternal ſucceſſion of worlds without creation. The Peguers hold the doctrine of the Metempſychoſis, or tranſmigration of the human ſoul, which, after paſſing through the bodies of various animals, ſhall attain to the perfection and felicity of their gods; which in effect is no other than a ſtate of annihilation. They have a ſtrong opinion of the ſanctity of apes and crocodiles, inſomuch that they believe the perſons to be perfectly happy that are devoured by them. Their temples are of a conic form, and ſome of them a quarter of a mile round. They obſerve a great many feſtivals, ſome of which are called *ſapan*. The images of their inferior gods are in a ſitting poſture, with their legs acroſs, and toes of equal length: their arms and hands very ſmall in proportion to their bodies; their faces longer than human; their ears long, and the lappets very thick. The congregation bow to them when they come in and when they go out; and that is all the worſhip which they pay to them. The prieſts of Pegu, called *talapoins*, are a ſort of medicant friars. They obſerve celibacy; and eat but once a-day; living in the woods, in a ſort of neſts or cages built on the tops of trees for fear of the tygers. They preach frequently, lead very innocent lives, and are very hoſpitable and humane.

The king of Pegu's revenues ariſe chiefly from the rent of lands, of which he is the ſole proprietor. Another branch of it are the duties paid for the commodities imported or exported. In a word, he is judged the richeſt monarch in the world, next to the emperor of China.

PEINE FORT ET DURE, (Lat. *poena fortis et dura*), ſignifies a ſpecial puniſhment inflicted on thoſe who, being arraigned of felony, refuſe to put themſelves on the ordinarily trial, but ſtubbornly ſtand mute; it is vulgarly called *preſſing to death*. See ARRAIGNMENT.

PEIRCE (James), an eminent diſſenting miniſter, was born at Wapping, in London, in the year 1674, and was educated at Utrecht and Leyden; after which he ſpent ſome time at Oxford, in order to enjoy the benefit of frequenting the Bodleian library. He then for two years preached the Sunday-evening's lecture at the meeting-houſe in Miles-Lane, London, and then ſettled at Cambridge. In 1713, he was removed to a congregation at Exeter, where he continued till the year 1718: when the Calviniſts among the diſſenters propoſing a ſubſcription to articles of faith to be ſigned by all the diſſenting miniſters in the kingdom, ſeveral articles were propoſed to him and Mr John Hallet, another diſſenting miniſter at Exeter, in order to their ſubſcribing them, they both refuſed, imagining this proceeding of their diſſenting brethren to be an unworthy impoſition on religious liberty and private judgment; for which they were ejected from their congregation. Upon this, a new meeting was opened for

Pekin.

for them at Exeter, of which Mr Pierce continued miniſter till his death, in 1726. He was a man of the ſtricteſt virtue, exemplary piety, and great learning. He wrote, 1. *Exercitatio philoſophica de Homœmeria Anaxagorea.* 2. Thirteen pieces on the Controverſy between the Church of England and the Diſſenters. 3. Ten pieces on the Controverſy about the Ejectment at Exeter. 4. Six pieces on the Doctrine of the Trinity. 5. A Paraphraſe and Notes on the Epiſtles of St Paul to the Coloſſians, Philippians, and Hebrews. 6. An Eſſay in favour of giving the Euchariſt to Children. 7. Fourteen Sermons.

PEKIN, the capital city of the empire of China in Aſia, where the emperor generally reſides. It is an exact ſquare, and divided into two parts; namely, that which contains the emperor's palace, which is in the new city, or the Tartars city, becauſe it is inhabited by Tartars ever ſince they conquered this empire; the other, called the *Old City*, is inhabited by the Chineſe. The circuit of both theſe together is 52 Chineſe lys, each of which contains 240 geometrical paces. The gates of this city are high and well arched, ſupporting buildings of nine ſtories high; the loweſt of which is for the ſoldiers when they come off guard. The gates are nine in number; and before each is an open ſpace, which ſerves for a parade. The ſtreets are as ſtraight as a line, moſt of which are three miles in length, and about 120 feet wide, with ſhops on both ſides; but the houſes are poorly built, and have only a ground-floor. It is ſupriſing to ſee what numbers of people there are in the ſtreets, and not one woman among them; there is always a great confuſion, occaſioned by the vaſt numbers of horſes, camels, mules, aſſes, waggons, carts, and chairs, without reckoning the ſeveral mobs which gather about jugglers, ballad-ſingers, and the like. Perſons of diſtinction have always a horſeman, who goes before them to clear the way. All the riches and merchandiſes of the empire are continually pouring into this city. There are always hackney-horſes and chairs in various parts, which ſtand ready to be hired for a trifle; and the owners of them know every ſtreet and houſe where any conſiderable perſon lives. All the great ſtreets are guarded by ſoldiers, who patrole night and day with ſwords by their ſides, and whips in their hands, to chaſtiſe thoſe who make any diſturbance, or take them into cuſtody. The little ſtreets have lattice-gates at their entrance into the great ſtreets, which are ſhut up at nights, and guarded by ſoldiers, who ſuffer no aſſemblies in the ſtreets at that time, and examine all that paſs along. The emperor's palace is of vaſt extent, and ſurrounded with a brick wall, with pavilions at each corner, encompaſſed by galleries ſupported by columns. But it would be endleſs to give an account of the different apartments, with their ornaments and furniture, as well as of the different magazines, and rich commodities kept therein; not to mention the ſupreme courts of juſtice, which are ſix in number, and are only to be controuled by the emperor and the grand council. Thoſe who have computed the compaſs of this city a different way, obſerve, that it is 20 miles in circumference, and that the number of inhabitants is at leaſt 2,000,000; that the walls are ſo high that they cover the town, and are broad enough for ſeveral horſemen to ride a-breaſt; and there are ſtrong towers a bow-ſhot diſtant from each other. The walls of the emperor's palace, including that and the gardens, are about two miles in length; and the architecture of the ſtructures entirely different from that of the Europeans, for they are covered with tiles of a ſhining beautiful yellow. The temples and the towers of this city are ſo numerous, that it is difficult to count them. The country about it is plain, but ſandy, and not very fruitful; yet proviſions of all kinds are exceeding plentiful, they being, as well as the merchandiſes, brought from other parts by means of canals cut from the rivers, and always crowded with veſſels of different ſizes. An earthquake which happened here in 1731 buried above 100,000 perſons in the ruins of the houſes, which were thrown down. E. Long. 116. 41. N. Lat. 39. 54.

Pelagians, Pelagius.

PELAGIANS, a Chriſtian ſect who appeared about the fifth or end of the fourth century. They maintained the following doctrines. 1. That Adam was by nature mortal, and whether he had ſinned or not, would certainly have died. 2. That the conſequences of Adam's ſin were confined to his own perſon. 3. That new-born infants are in the ſame ſituation with Adam before the fall. 4. That the law qualified men for the kingdom of heaven, and was founded upon equal promiſes with the goſpel. 5. That the general reſurrection of the dead does not follow in virtue of our Saviour's reſurrection. 6. That the grace of God is given according to our merits. 7. That this grace is not granted for the performance of every moral act; the liberty of the will, and information in points of duty, being ſufficient, &c. The founder of this ſect was

PELAGIUS, a native of Great Britain; but whether of England, Scotland, or Wales, is as uncertain as it is immaterial. He was born towards the cloſe of the fourth century, and educated in the monaſtery of Banchor, in Wales, of which he became a monk, and afterwards abbot. In the early part of his life he went over to France, and thence to Rome, where he had the inſolence to promulgate certain opinions ſomewhat different from thoſe of the infallible church. His morals being irreproachable, he gained many diſciples; and the dreadful hereſy made ſo rapid a progreſs, that, for the ſalvation of ſouls, it became neceſſary for the pope to exert his power. Pelagius, to avoid the danger, in the year 409, paſſed over to Sicily, attended by his friend and pupil Celeſtius. In 411 they landed in Africa, continued ſome time at Hippo, and were preſent at the famous conference between the Catholics and Donatiſts which was held at Carthage in 412. From thence they travelled to Egypt; and from Egypt, in 415, to Paleſtine, where they were graciouſly received by John biſhop of Jeruſalem. In the ſame year, Pelagius was cited to appear before a council of ſeventeen biſhops, held at Dioſpolis. They were ſatisfied with his creed, and abſolved him of hereſy. The African biſhops, however, being diſpleaſed with their proceedings, appealed to the Roman pontiff: he firſt approved, and afterwards condemned the opinions of Pelagius, who, with his pupil Celeſtius, was publicly excommunicated; and all the biſhops who refuſed to ſubſcribe the condemnation of the Pelagian hereſy were immediately deprived. What became of him after this period, is entirely unknown; but it ſeems very probable that he retired to Banchor, and died abbot of that monaſtery. He wrote, 1. *Expoſitionum in epiſt. Paulinas* lib. xiv. 2. *Epiſtola ad Demetriadem de virginitate*. 3. *Explanationis ſymboli ad Damaſum*. 4. *Epiſtolæ ad viduam duæ*. 5. *De libero arbitrio*. Theſe and many other fragments are ſcattered among the works of St Jerom. They are alſo collected by Garnerius, and publiſhed in Append. op. Mercatoris, p. 373. *Cave*.

PELASGI. See PELASGIOTIS.

PELASGIA, (Pliny); the ancient name of *Leſbos;* ſo called from the Pelaſgi, its firſt inhabitants, (Diodorus Siculus). Alſo the ancient name of *Peloponneſus*, from Pelaſgius, a native of the country, (Nicolaus Damaſcenus, Ephorus).

PELASGICUM, (Pauſanias, Pliny); the north wall of Athens; ſo called from the builders, the Pelaſgi. There was an execration pronounced on any that ſhould build houſes under this wall; becauſe the Pelaſgi, while dwelling there, entered into a conſpiracy againſt the Athenians, (Thucydides).

PELASGIOTIS, a third part of Theſſaly, (Strabo); ſo called from a very ancient people, the Pelaſgi, called *Pelaſgiotæ*, (Ptolemy); who formerly, together with the Æolians, occupied Theſſaly, and thence that part was called *Pelaſgicum Argos;* beſides many other parts of Greece. Their name *Pelaſgi*, or *Pelargi*, denoting ſtorks, was given them from their wandering roving life, (Strabo). The poets extend the appellation to Greeks in general. *Pelaſgus*, the epithet. Some of the inhabitants of Crete were called *Pelaſgi*, (Homer); who thus alſo calls the neighbouring people to the Cilicians in Troas. The Pelaſgi were originally of Arcadia, (Heſiod); but Æſchylus makes Argos, near Mycenæ, their country. The Pelaſgiotis was ſituate between Pieria and Macedonia to the north and weſt, Theſſaliotis to the ſouth, and Magneſia to the eaſt, (Strabo, Pliny).

PELE, (Stephanus); two towns of this name in Theſſaly; the one ſubject to Eurypylus, the other to Achilles; both extinct. *Peleus* the gentilitious name, id.

PELETHRONIUM, (Nicander and Scholiaſt); a town of Theſſaly, ſituate in a flowery part of mount Pelios; and hence the appellation *throna*, ſignifying flowers. *Pelethronii*, the people, (Virgil); the *Lapithæ* ſo called, who firſt broke horſes. Lucan ſays the Centaurs were natives of that place; to whom Virgil aſſigns mount Othrys. Moſt authors, however, aſcribe the breaking of horſes to the Centaurs. Some make the Lapithæ and Centaurs the ſame; others a different people; allowed however to be both of Theſſaly. Their ſtory is greatly involved in fable.

PELICAN, in ornithology. See PELICANUS.

PELICAN, in chemiſtry, is a glaſs alembic conſiſting of one piece. It has a tubulated capital, from which two oppoſite and crooked beaks paſs out, and enter again at the belly of the cucurbit. This veſſel has been contrived for a continued diſtillation and cohobation, which chemiſts call *circulation*. The volatile parts of ſubſtances put into this veſſel riſe into the capital, and are obliged to return through the crooked beaks into the cucurbit; and this without interruption, or luting and unluting the veſſels.

Although the pelican ſeems to be a very convenient inſtrument, it is nevertheleſs little uſed, and even much neglected at preſent; either becauſe the modern chemiſts have not ſo much patience as the ancient chemiſts had for making long experiments; or becauſe they find that two matreſſes, the mouth of one of which is inſerted into the mouth of the other, produce the ſame effect.

PELICANUS, in ornithology, a genus belonging to the order of anſeres. The bill is ſtrait, without teeth, and crooked at the point; the face is naked, and the feet are palmated. There are eight ſpecies, principally diſtinguiſhed by the ſhape of their tails. The moſt remarkable are,

1. The carbo, or corvorant, ſometimes exceeds ſeven pounds in weight; the length three feet four; the extent four feet two; the bill duſky, five inches long, deſtitute of noſtrils; the baſe of the lower mandible is covered with a naked yellow ſkin, that extends under the chin, and forms a ſort of pouch; a looſe ſkin of the ſame colour reaches from the upper mandible round the eyes and angles of the mouth; the head and neck are of a ſooty blackneſs; but under the chin of the male the feathers are white: and the head in that ſex is adorned with a ſhort looſe pendant creſt; in ſome the creſt and hind-part of the head are ſtreaked with white. The coverts of the wings, the ſcapulars, and the back, are of a deep green, edged with black, and gloſſed with blue; the quill-feathers and tail duſky; the legs are ſhort, ſtrong, and black; the middle claw ſerrated on the inſide; the irides are of a light aſh-colour.

Theſe birds occupy the higheſt parts of the cliffs that impend over the ſea: they make their neſts of ſticks, ſea-tang, graſs, &c. and lay ſix or ſeven white eggs of an oblong form. In winter they diſperſe along the ſhores, and viſit the freſh waters, where they make great havoc among the fiſh. They are remarkably voracious, having a moſt ſudden digeſtion, promoted by the infinite quantity of ſmall worms that fill their inteſtines. The corvorant has the rankeſt and moſt diſagreeable ſmell of any bird, even when alive. Its form is diſagreeable; its voice hoarſe and croaking, and its qualities baſe. Theſe birds, however, have been trained to fiſh like falcons to fowl Whitelock tells us, that he had a caſt of them manned like hawks, and which would come to hand. He took much pleaſure in them; and relates, that the beſt he had was one preſented him by Mr Wood, maſter of the corvorants to Charles I. It is well known that the Chineſe make great uſe of theſe birds, or a congenerous ſort, in fiſhing; and that not for amuſement, but profit.

2. The graculus, or ſhag, called in the north of England the *crane*, is much inferior in ſize to the corvorant: the length is 27 inches; the breadth three feet ſix; the weight three pounds three quarters. The bill is four inches long, and more ſlender than that of the preceding: the head is adorned with a creſt two inches long, pointing backward; the whole plumage of the upper part of this bird is of a fine and very ſhining green; the edge of the feathers a purpliſh black; but the lower part of the back, the head, and neck, wholly green; the belly is duſky; the tail of a duſky hue, tinged with green; the legs are black, and like thoſe of the corvorant.

Both theſe kinds agree in their manners, and breed in the ſame places; and, what is very ſtrange in web-footed birds, will perch and build in trees: both ſwim with their head quite erect, and are very difficult to be ſhot; for, like the grebes and divers, as ſoon as they ſee the flaſh of the gun, they pop under water, and never riſe but at a conſiderable diſtance.

3. The baſſanus, gannet, or ſolan gooſe, weighs ſeven pounds; the length is three feet one inch; the breadth ſix feet two inches. The bill is ſix inches long, ſtrait almoſt to the point, where it inclines down; and the ſides are irregularly jagged, that it may hold its prey with more ſecurity: about an inch from the baſe of the upper mandible is a ſharp proceſs pointing forward; it has no noſtrils; but in their place a long furrow, that reaches almoſt to the end of the bill: the whole is of a dirty white, tinged with aſh-colour. The tongue is very ſmall, and placed low in the mouth; a naked ſkin of a fine blue ſurrounds the eyes, which are of a pale yellow, and are full of vivacity: this bird is remarkable for the quickneſs of its ſight. Martin tells us, that *ſolan* is derived from an Iriſh word expreſſive of that quality.

From the corner of the mouth is a narrow ſlip of black bare ſkin, that extends to the hind-part of the head; beneath the chin is another, that, like the pouch of the Pelican, is dilatable, and of ſize ſufficient to contain five or ſix entire herrings; which in the breeding ſeaſon it carries at once to its mate or young.

The young birds, during the firſt year, differ greatly in colour from the old ones; being of a duſky hue, ſpeckled with numerous triangular white ſpots; and at that time reſemble in colours the ſpeckled diver. Each bird, if left undiſturbed, would only lay one egg in the year; but if that be taken away, they will lay another; if that is alſo taken, then a third; but never more that ſeaſon. Their egg is white, and rather leſs than that of the common gooſe; the neſt is large, and formed of any thing the bird finds floating on the water, ſuch as graſs, ſea-plants, ſhavings, &c. Theſe birds frequent the Iſle of Aliſa, in the frith of Clyde; the rocks adjacent to St Kilda; the Stack of Souliſkery, near the Orkneys; the Skelig Iſles, off the coaſts of Kerry, Ireland; and the Baſs Iſle, in the frith of Edinburgh: the multitudes that inhabit theſe places are prodigious. Dr Harvey's elegant account of the latter will ſerve to give ſome idea of the numbers of theſe, and of the other birds that annually migrate to that little ſpot.

"There is a ſmall iſland, called by the Scotch *Baſs Iſland*, not more than a mile in circumference; the ſurface is almoſt wholly covered during the months of May and June with neſts, eggs, and young birds; ſo that it is ſcarcely poſſible to walk without treading on them: and the flocks of birds in flight are ſo prodigious, as to darken the air like clouds; and their noiſe is ſuch, that you cannot without difficulty hear your next neighbour's voice. If you look down upon the ſea from the top of the precipice, you will ſee it on every ſide covered with infinite numbers of birds of different kinds, ſwimming and hunting for their prey: if in ſailing round the iſland you ſurvey the hanging cliffs, you may ſee in every cragg or fiſſure of the broken rocks innumerable birds of various ſorts and ſizes, more than the ſtars of heaven when viewed in a ſerene night: if from afar you ſee the diſtant flocks, either flying to or from the iſland, you would imagine them to be a vaſt ſwarm of bees."

Nor do the rocks of St Kilda ſeem to be leſs frequented by theſe birds; for Martin aſſures us, that the inhabitants of that ſmall iſland conſume annually no leſs than 22,600 young birds of this ſpecies, beſides an amazing quantity of their eggs, theſe being their principal ſupport throughout the year: they preſerve both eggs and fowls in pyramidal ſtone-buildings, covering them with turf-aſhes to preſerve them from moiſture. This is a dear-bought food, earned at the hazard of their lives, either by climbing the moſt difficult and narrow paths, where (to appearance) they can barely cling, and that too at an amazing height over the raging ſea; or elſe, being lowered down from above, they collect their annual proviſion, thus hanging in midway air; placing their whole dependance on the uncertain footing of one perſon, who holds the rope by which they are ſuſpended at the top of the precipice. The young birds are a favourite diſh with the North Britons in general: during the ſeaſon, they are conſtantly brought from the Baſs Iſle to Edinburgh, ſold at 20 d. a-piece, are roaſted, and ſerved up a little before dinner as a whet.

The gannets are birds of paſſage. Their firſt appearance in thoſe iſlands is in March; their continuance there till Auguſt or September, according as the inhabitants take or leave their firſt egg; but, in general, the time of breeding, and that of their departure, ſeems to coincide with the arrival of the herring, and the migration of that fiſh (which is their principal food) out of thoſe ſeas. It is probable that theſe birds attend the herring and pilchard during their whole circuit round the Britiſh iſlands; the appearance of the former being always eſteemed by the fiſhermen as a ſure preſage of the approach of the latter. It migrates in queſt of food as far ſouth as the mouth of the Tagus, being frequently ſeen off Liſbon during the month of September, plunging for ſardinæ, fiſh reſembling, if not the ſame with our pilchard.

In the month of Auguſt Mr Pennant has obſerved in Cathneſs their northern migrations: he has ſeen them paſſing the whole day in flocks, from five to fifteen in each: in calm weather they fly high; in ſtorms they fly low and near the ſhore; but never croſs over the land, even when a bay with promontories intervenes, but follow, at an equal diſtance, the courſe of the bay, and regularly double every cape. Many of the parties made a ſort of halt for the ſake of fiſhing: they ſoared to a vaſt height, then darting headlong into the ſea, made the water foam and ſpring up with the violence of their deſcent; after which they purſued their route. Our author inquired whether they ever were obſerved to return ſouthward in the ſpring, but was anſwered in the negative; ſo it appears that they annually encircle the whole iſland.

They are well known on moſt of the coaſts of England, but not by the name of the *Solan gooſe*. In Cornwal and in Ireland they are called *gannets;* by the Welſh, *gan*. Mr Ray ſuppoſed the Corniſh gannet to be a ſpecies of large gull: a very excuſeable miſtake; for during his ſix months reſidence in Cornwal, he never had an opportunity of ſeeing that bird, except flying; and in the air it has the appearance of a gull. On that ſuppoſition he gave our ſkua the the title of *cataracta*, a name borrowed from Ariſtotle, and which admirably expreſſes the rapid deſcent of this bird on its prey. Mr Moyle firſt detected this miſtake; and the Rev. Dr William Borlaſe, by preſenting us with a fine ſpecimen of this bird, confirms the opinion of Mr Moyle; at the ſame time giving the following natural hiſtory of the bird.

"The gannet comes on the coaſts of Cornwal in the latter end of ſummer, or beginning of autumn; hovering over the ſhoals of pilchards that come down to us through St George's Channel from the northern ſeas. The gannet ſeldom comes near the land, but is conſtant to its prey, a ſure ſign to the fiſhermen that the pilchards are on the coaſts; and when the pilchards retire, generally about the end of November, the gannets are ſeen no more. The bird now ſent was killed at Chandour, near Mountſbay, Sept. 30. 1762, after a long ſtruggle with a water-ſpaniel, aſſiſted by the boatmen; for it was ſtrong and pugnacious. The perſon who took it obſerved that it had a tranſparent membrane under the eye-lid, with which it covered at pleaſure the whole eye, without obſcuring the ſight or ſhutting the eye-lid; a gracious proviſion for the ſecurity of the eyes of ſo weighty a creature, whoſe method of taking its prey is by darting headlong on it from a height of 150 feet or more into the water. About four years ago, one of theſe birds flying over Penzance, (a thing that rarely happens), and ſeeing ſome pilchards lie on a fir-plank, in a cellar uſed for curing fiſh, darted itſelf down with ſuch violence, that it ſtruck its bill quite through the board, (about an inch and a quarter thick), and broke its neck."

Theſe birds are ſometimes taken at ſea by a deception of the like kind. The fiſhermen faſten a pilchard to a board, and leave it floating; which inviting bait decoys the unwary gannet to its own deſtruction.

In the *Cataracta* of Juba may be found many characters of this bird: he ſays, that the bill is toothed; that its eyes are fiery; and that its colour is white: and in the very name is expreſſed its furious deſcent on its prey. The reſt of his accounts ſavour of fable.—We are uncertain whether the gannet breeds in any other parts of Europe beſides our own iſlands; except (as Mr Ray ſuſpects, the ſula, deſcribed in Cluſius's Exotics, which breeds in Ferroe Iſles) be the ſame bird.

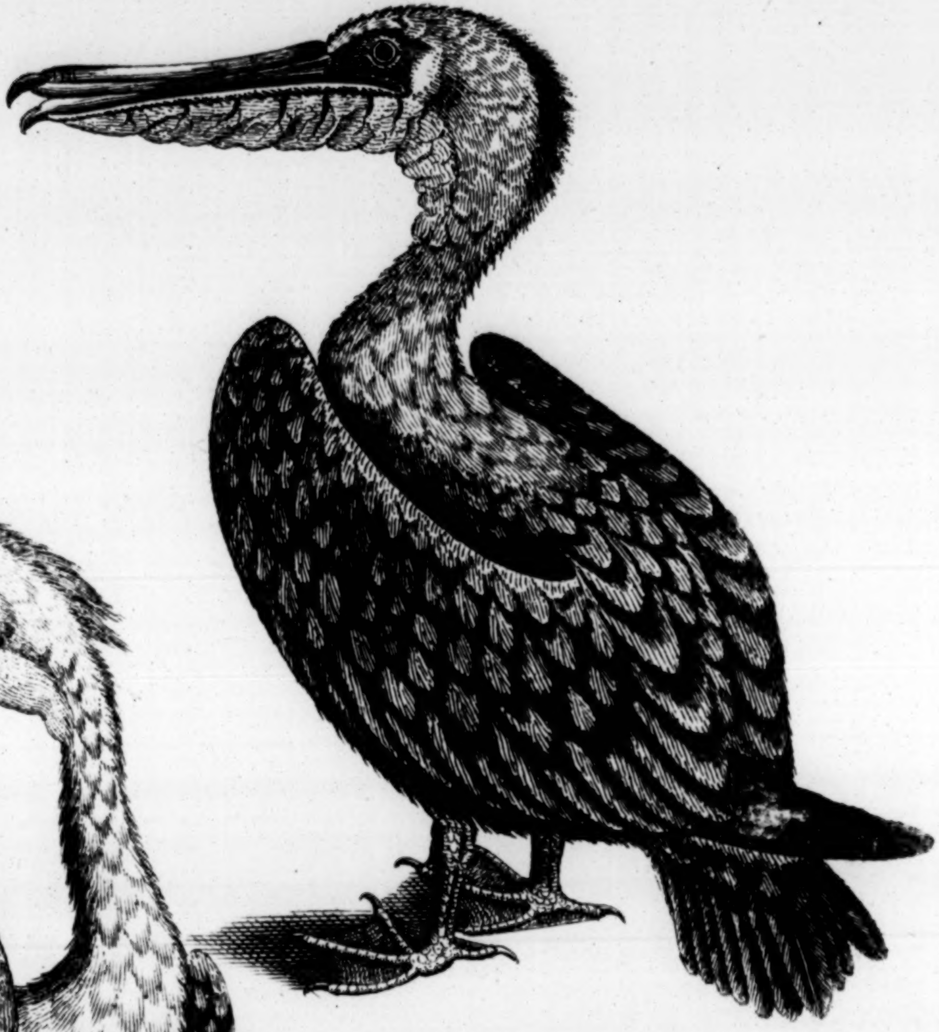
4. The ſula, or booby, is ſomewhat leſs than a gooſe; the baſis of the bill yellow, and of bare feathers; the eyes of a light-grey colour; the lower part of the bill of a light brown. The colours of the body are brown and white; but varied ſo in different individuals, that they cannot be deſcribed by them. Their wings are very long; their legs and feet pale yellow, ſhaped like thoſe of corvorants. They frequent the Bahama iſlands, where they breed all months in the year, laying one, two, or three eggs on the bare rock. While young, they are covered with a white down, and continue ſo till they are almoſt ready to fly. They feed on fiſh like the reſt of this genus; but have a very troubleſome enemy of the man of war bird, which lives on the ſpoils obtained from other ſea-birds, particularly the booby. As ſoon as this rapacious enemy perceives that the booby has taken a fiſh, he flies furiouſly at him, upon which the former dives to avoid the blow; but as he cannot ſwallow his prey below water, he is ſoon obliged to come up again with the fiſh in his bill as before, when he ſuffers a new aſſault; nor does his enemy ceaſe to perſecute him till he lets go the fiſh, which the other immediately carries off.

5. The great booby, by Linnæus called *pelicani Balſani puſſus*, frequents the rivers and ſea-coaſts of Florida, purſuing and devouring fiſhes like others of the genus. Mr Cateſby informs us, that he has ſeveral times found them diſabled, and ſometimes dead, on the ſhore; whence he thinks that they meet with ſharks or other voracious fiſhes, which deſtroy them. The bird is about the ſize of a gooſe; the head and neck remarkably prominent; the back of a brown colour; the belly duſky white; the feet black, and ſhaped like thoſe of a corvorant; the head elegantly ſpotted with white; the wings extend ſix feet when ſpread. Both this ſpecies and the laſt have a joint in the upper mandible of the bill, by which they can raiſe it conſiderably from the lower one without opening the mouth.

6. The onocrotalus, or pelican of Aſia, Africa, and America; though Linnæus thinks that the pelican of America may poſſibly be a diſtinct variety. This creature, in Africa, is much larger in the body than a ſwan, and ſomewhat of the ſame ſhape and colour. Its four toes are all webbed together; and its neck in ſome meaſure reſembles that of a ſwan: but that ſingularity in which it differs from all other birds is in the bill and the great pouch underneath. This enormous bill is 15 inches from the point to the opening of the mouth, which is a good way back behind the eyes. At the baſe the bill is ſomewhat greeniſh, but varies towards the end, being of a reddiſh blue. It is very thick in the beginning, but tapers off to the end, where it hooks downwards. The under-chap is ſtill more extraordinary; for to the lower edges of it hang a bag, reaching the whole length of the bill to the neck, which is ſaid to be capable of containing 15 quarts of water. This bag the bird has a power of wrinkling up into the hollow of the under-chap; but by opening the bill, and putting one's hand down into the bag, it may be diſtended at pleaſure. The ſkin of which it is formed will then be ſeen of a bluiſh aſh-colour, with many fibres and veins running over its ſurface. It is not covered with feathers, but a ſhort downy ſubſtance as ſmooth and as ſoft as ſatin, and is attached all along the under edges of the chap, to be fixed backward to the neck of the bird by proper ligaments, and reaches near half way down. When this bag is empty it is not ſeen; but when the bird has fiſhed with ſucceſs, it is then incredible to what an extent it is often ſeen dilated. For the firſt thing the pelican does in fiſhing is to fill up the bag; and then it returns to digeſt its burden at leiſure. When the bill is opened to its wideſt extent, a perſon may run his head into the bird's mouth, and conceal it in this monſtrous pouch, thus adapted for very ſingular purpoſes. Yet this is nothing to what Ruyſch aſſures us, who avers that a man has been ſeen to hide his whole leg, boot and all, in the monſtrous jaws of one of theſe animals. At firſt appearance this would ſeem impoſſible, as the ſides of the under chap, from which the bag depends, are not

Plate CCXXXIV.

Fig. 2.



PELECANUS

Fig. 1.

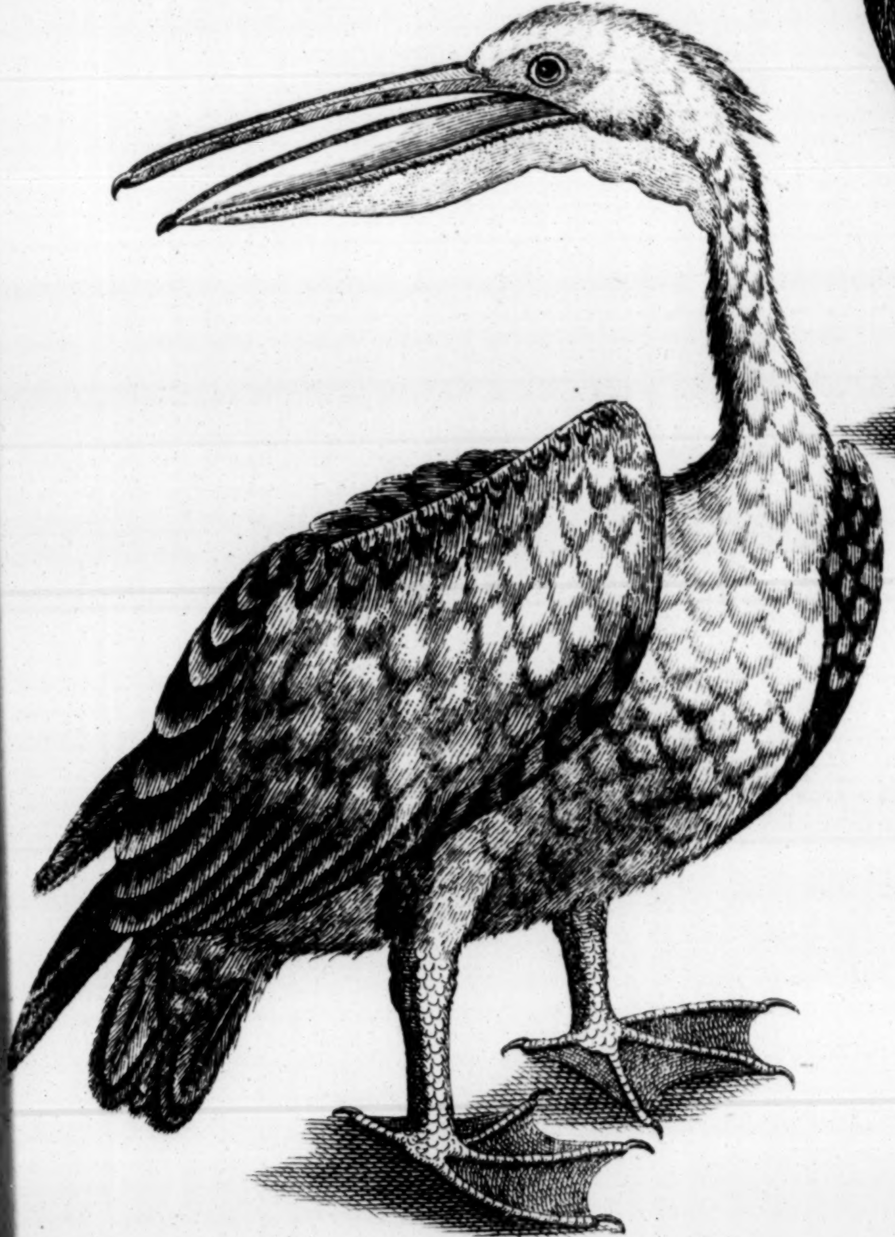
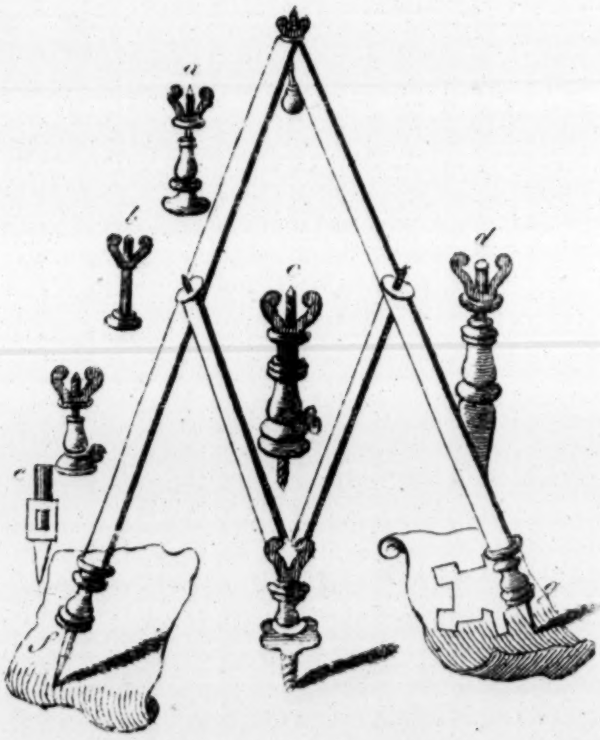


Fig. 3.

PENTAGRAPH



A. Bell Sculpt.

3 MA 53

not above an inch aſunder when the bird's bill is firſt opened; but then they are capable of great ſeparation; and it muſt neceſſarily be ſo, as the bird preys upon large fiſhes, and hides them by dozens in its pouch. Tertre affirms, that it will hide as many fiſh as will ſerve 60 hungry men for a meal.

The pelican was once alſo known in Europe, particularly in Ruſſia ; but it ſeems to have deſerted our coaſts. This is the bird of which ſo many fabulous accounts have been propagated; ſuch as its feeding its young with its own blood, and its carrying a proviſion of water for them in its great reſervoir in the deſart. But the abſurdity of the firſt account anſwers itſelf; and as for the latter, the pelican uſes its bag for very different purpoſes than that of filling it with water.

Its amazing pouch may be conſidered as analogous to the crop in other birds; with this difference, that as theirs lies at the bottom of the gullet, ſo this is placed at the top. Thus, as pigeons and other birds macerate their food for their young in their crops, and then ſupply them; ſo the pelican ſupplies its young by a more ready contrivance, and macerates their food in its bill, or ſtores it for its own particular ſuſtenance.

The ancients were particularly fond of giving this bird admirable qualities and parental affections: ſtruck, perhaps, with its extraordinary figure, they were willing to ſupply it with as extraordinary appetites; and having found it with a large reſervoir, they were pleaſed with turning it to the moſt tender and parental uſes. But the truth is, the pelican is a very heavy, ſluggiſh, voracious bird, and very ill fitted to take thoſe flights, or to make thoſe cautious proviſions for a diſtant time, which we have been told they do.

The pelican, ſays Labat, has ſtrong wings, furniſhed with thick plumage of an aſh-colour, as are the reſt of the feathers over the whole body. Its eyes are very ſmall, when compared to the ſize of its head; there is a ſadneſs in its countenance, and its whole air is melancholy. It is as dull and reluctant in its motions as the flamingo is ſprightly and active. It is ſlow of flight; and when it riſes to fly, performs it with difficulty and labour. Nothing, as it would ſeem, but the ſpur of neceſſity could make theſe birds change their ſituation, or induce them to aſcend into the air: but they muſt either ſtarve or fly.

They are torpid and inactive to the laſt degree, ſo that nothing can exceed their indolence but their gluttony; it is only from the ſtimulations of hunger that they are excited to labour; for otherwiſe they would continue always in fixed repoſe. When they have raiſed themſelves about 30 or 40 feet above the ſurface of the ſea, they turn their head with one eye downwards, and continue to fly in that poſture. As ſoon as they perceive a fiſh ſufficiently near the ſurface, they dart down upon it with the ſwiftneſs of an arrow, ſeize it with unerring certainty, and ſtore it up in their pouch. They then riſe again, though not without great labour, and continue hovering and fiſhing, with their head on one ſide as before.

This work they continue with great effort and induſtry till their bag is full, and then they fly to land to devour and digeſt at leiſure the fruits of their induſtry. This, however, it would appear, they are not long performing; for towards night they have another hungry call; and they again reluctantly go to labour. At night, when their fiſhing is over, and the toil of the day crowned with ſucceſs, theſe lazy birds retire a little way from the ſhore; and, though with the webbed feet and clumſy figure of a gooſe, they will be contented to perch nowhere but upon trees among the light and airy tenants of the foreſt. There they take their repoſe for the night; and often ſpend a great part of the day, except ſuch times as they are fiſhing, ſitting in diſmal ſolemnity, and, as it would ſeem, half aſleep. Their attitude is with the head reſting upon their great bag, and that reſting upon their breaſt. There they remain without motion, or once changing their ſituation, till the calls of hunger break their repoſe, and till they find it indiſpenſibly neceſſary to fill their magazine for a freſh meal. Thus their life is ſpent between ſleeping and eating; and our author adds, that they are as foul as they are voracious, as they are every moment voiding excrements in heaps as large as one's fiſt.

The ſame indolent habits ſeem to attend them even in preparing for incubation, and defending their young when excluded. The female makes no preparation for her neſt, nor ſeems to chooſe any place in preference to lay in; but drops her eggs on the bare ground to the number of five or ſix, and there continues to hatch them. Attached to the place, without any deſire of defending her eggs or her young, ſhe tamely ſits and ſuffers them to be taken from under her. Now and then ſhe juſt ventures to peck, or to cry out when a perſon offers to beat her off.

She feeds her young with fiſh macerated for ſome time in her bag; and when they cry flies off for a new ſupply. Labat tells us, that he took two of theſe when very young, and tied them by the leg to a poſt ſtuck into the ground, where he had the pleaſure of ſeeing the old one for ſeveral days come to feed them, remaining with them the greateſt part of the day, and ſpending the night on the branch of a tree that hung over them. By theſe means they were all three become ſo familiar, that they ſuffered themſelves to be handled; and the young ones very kindly accepted whatever fiſh he offered them. Theſe they always put firſt into their bag, and then ſwallowed at their leiſure.

It ſeems, however, that they are but diſagreeable and uſeleſs domeſtics; their gluttony can ſcarcely be ſatisfied; their fleſh ſmells very rancid; and taſtes a thouſand times worſe than it ſmells. The native Americans kill vaſt numbers; not to eat, for they are not fit even for the banquet of a ſavage; but to convert their large bags into purſes and tobacco-pouches. They beſtow no ſmall pains in dreſſing the ſkin with ſalt and aſhes, rubbing it well with oil, and then forming it to their purpoſe. It thus becomes ſo ſoft and pliant, that the Spaniſh women ſometimes adorn it with gold and embroidery to make work-bags of.

Yet, with all the ſeeming hebetude of this bird, it is not entirely incapable of inſtruction in a domeſtic ſtate. Father Raymond aſſures us, that he has ſeen one ſo tame and well educated among the native Americans, that it would go off in the morning at the word of command, and return before night to its maſter, with its great paunch diſtended with plunder; a part of which the ſavages would make it diſgorge, Pelion, Pella.

and a part they would permit it to reſerve for itſelf.

" The pelican," as Faber relates, " is not deſtitute of other qualifications. One of thoſe which was brought alive to the duke of Bavaria's court, where it lived 40 years, ſeemed to be poſſeſſed of very uncommon ſenſations. It was much delighted in the company and converſation of men, and in muſic both vocal and inſtrumental; for it would willingly ſtand," ſays he, " by thoſe that ſung or ſounded the trumpet; and ſtretching out its head, and turning its ear to the muſic, liſtened very attentively to its harmony, though its own voice was little pleaſanter than the braying of an aſs." Geſner tells us, that the emperor Maximilian had a tame pelican which lived for above 80 years, and that always attended his army on their march. It was one of the largeſt of the kind, and had a daily allowance by the emperor's orders. As another proof of the great age to which the pelican lives, Aldrovandus makes mention of one of theſe birds that was kept ſeveral years at Mechlin, and was verily believed to be 50 years old.—We often ſee theſe birds at our ſhews about town.

PELION, (Diodorus Siculus, &c.) *Pelios, mons* underſtood, (Mela, Virgil, Horace, Seneca), a mountain of Theſſaly near Oſſa, and hanging over the Sinus Pelaſgicus, or Pagaſicus; its top covered with pines, the ſides with oaks, (Ovid). Said alſo to abound in wild aſh, (Val. Flaccus). From this mountain was cut the ſpear of Achilles, called *pelias;* which none but himſelf could wield, (Homer). Dicearchus, Ariſtotle's ſcholar, found this mountain 1250 paces higher than any other of Theſſaly, (Pliny). *Pelius,* Cicero; *Peliacus,* (Catullus), the epithet.

PELLA, (an. geog.) a town ſituate on the confines of Emathia, a diſtrict of Macedonia, (Ptolemy); and therefore Herodotus allots it to Bottiæa, a maritime diſtrict on the Sinus Thermaicus. It was the royal reſidence, ſituate on an eminence, verging to the ſouth-weſt, encompaſſed with unpaſſable marſhes ſummer and winter: in which, next the town, a citadel like an iſland riſes, placed on a bank or dam, a prodigious work, both ſupporting the wall and ſecuring it from any hurt by means of the circumfluent water. At a diſtance, it ſeems cloſe to the town, but is ſeparated from it by the Ludias, running by the walls, and joined to it by a bridge, (Livy): diſtant from the ſea 120 ſtadia, the Ludias being ſo far navigable, (Strabo). Mela calls the town *Pelle,* though moſt Greek authors write *Pella.* The birth-place of Philip, who enlarged it; and afterwards of Alexander, (Strabo, Mela). Continued to be the royal reſidence down to Perſes, (Livy). Called *Pella Colonia,* (Pliny); *Colonia Julia Auguſta,* (Coin). It afterwards came to decline, with but few and mean inhabitants, (Lucian). It is now called Τα Παλαλισια, the *Little Palace,* (Holſtenius). *Pellæus,* both the gentilitious name and the epithet, (Lucian, Juvenal, Martial).—Another PELLA, (Polybius, Pliny); a town of the Decapolis, on the other ſide the Jordan; abounding in water, like its cognominal town in Macedonia; built by the Macedonians, (Strabo); by Seleucus, (Euſebius); anciently called *Butis,* (Stephanus); *Apamea,* (Strabo); ſituate 35 miles to the north-eaſt of Geraſa, (Ptolemy). Thither the Chriſtians, juſt before the ſiege of Jeruſalem by Titus, were divinely admoniſhed to fly, (Euſebius). It was the utmoſt boundary of the Peræa, or Transjordan country, to the north, (Joſephus).

Pelletier ‖ Peluſium.

PELLETIER (JAMES), a doctor of phyſic, and an eminent mathematician, was born in 1517. He was an excellent Latin and French poet, a good orator, phyſician, and grammarian. He wrote, *Oeuvres Poetiques, Commentaires Latins ſur Euclide, &c.*

PELLETS, in heraldry, thoſe roundles that are black; called alſo *ogreſſes* and *gunſtones,* and by the French *torteaux de ſable.*

PELLICLE, among phyſicians, denotes a thin film or fragment of a membrane. Among chemiſts it ſignifies a thin ſurface of cryſtals uniformly ſpread over a ſaline liquor evaporated to a certain degree.

PELLISON, or PELLISON FONTANIER, (Paul), one of the fineſt geniuſes of the 17th century, was the ſon of James Pelliſon counſellor at Caſtres. He was born at Beziers in 1624, and educated in the Proteſtant religion. He ſtudied with ſucceſs the Latin, Greek, French, Spaniſh, and Italian tongues, and applied himſelf to the reading the beſt authors in theſe languages; after which he ſtudied the law at Caſtres with reputation. In 1652 he purchaſed the poſt of ſecretary to the king; and, five years after, became firſt deputy to M. Fouquet. He ſuffered by the diſgrace of that miniſter; and in 1661 was confined in the Baſtile; from whence he was not diſcharged till four years after. During his confinement he applied himſelf to the ſtudy of controverſy; and in 1670 abjured the Proteſtant religion. Lewis XIV. beſtowed upon him an annual penſion of 2000 crowns; and he likewiſe enjoyed ſeveral poſts. In 1676 he had the abbey of Giment, and ſome years after the priory of St Orens at Auch. He died in 1693. His principal works are, 1. The Hiſtory of the French Academy. 2. Reflectionson religious Diſputes, &c. in 4 vols 12m°. 3. The Hiſtory of Lewis XIV. 4. Hiſtorical Letters and Miſcellanies, in 3 vols 12mo.

PELOPONNESUS, (Dionyſius); a large peninſula, to the ſouth of the reſt of Greece; called, as it were, *Pelopis neſus* or *inſula,* though properly not an iſland, but a peninſula; yet wanting but little to be one, viz. the iſthmus of Corinth, ending in a point like the leaf of the Platane or plane-tree. Anciently called *Apia* and *Pelaſgia;* a peninſula ſecond to no other country for nobleneſs; ſituate between two ſeas, the Egean and Ionian, and reſembling a platane-leaf, on account of its angular receſſes or bays, (Pliny, Strabo, Mela). Strabo adds from Homer, that one of its ancient names was *Argos,* with the epithet *Achaicum,* to diſtinguiſh it from Theſſaly, called *Pelaſgicum.* Divided into ſix parts; namely, Argolis, Laconica, Meſſenia, Elis, Achaia, and Arcadia, (Mela). Now called the *Morea.*

PELOPS, in fabulous hiſtory, the ſon of Tantalus king of Phrygia, went into Elis, where he married Hippodamia the daughter of OEnomaus king of that country; and became ſo powerful, that all the territory which lies beyond the Iſthmus, and compoſes a conſiderable part of Greece, was called *Peloponneſus,* that is, the *iſland of Pelops,* from his name, and the word Νεσος.

PELUSIUM, (anc. geogr.); a noble and ſtrong city of Egypt, without the Delta, diſtant 20 ſtadia from the ſea; ſituate amidſt marſhes; and hence its name and its ſtrength. Called the *key* or *inlet of Egypt*, (Diodorus, Hirtius); which being taken, the reſt of Egypt lay quite open and expoſed to an enemy. Called *Sin*, (Ezekiel). *Peluſiacus*, the epithet, (Virgil, Diodorus). From its ruins aroſe Damietta. E. Long. 32°. N. Lat. 31°.

PELVIS, in anatomy. See there, n° 38.—41.

PEMBROKE, (Mary Counteſs of). See HERBERT.

PEMBROKESHIRE, a county of Wales, bounded on all ſides by the Iriſh ſea, except on the eaſt, where it joins to Caermarthenſhire, and on the north-eaſt to Cardiganſhire. It lies the neareſt to Ireland of any county in Wales. Its length is 26 miles, its breadth 20, and its circumference 93; within which it contains about 420,000 acres, 145 pariſhes, 7 hundreds, 1 city, 9 market-towns, 2 foreſts, and about 26,000 inhabitants. This county lies in the dioceſe of St David's, and ſends three members to parliament, viz. one for the ſhire, one for Haverfordweſt, and one for the town of Pembroke.

The air of Pembrokeſhire, conſidering its ſituation, is good; but it is in general better the farther from the ſea. As there are but few mountains, the ſoil is generally fruitful, eſpecially on the ſea-coaſts; nor are its mountains altogether unprofitable, but produce paſture ſufficient to maintain great numbers of ſheep and goats. Its other commodities are corn, cattle, pit-coal, marle, fiſh, and fowl. Among theſe laſt are falcons, called here *peregrins*. The inhabitants of this county make a very pleaſant durable fire of culm, which is the duſt of coal made up into balls, with a third part of mud. The county is well watered by the rivers Clethy, Dougledye, Cledhew, and Teive; which laſt parts it from Cardiganſhire. There is a diviſion of the county ſtyled *Rhos* in the Welſh, by which is meant a large green plain. This is inhabited by the deſcendants of the Flemings, placed there by Henry I. to curb the Welſh, who were never able to expel them, though they often attempted it. On the coaſts of this county, as well as on thoſe of Glamorganſhire and the Severn Sea, is found the *lactuca marina* of Cambden, being a marine plant or weed, which, when dreſſed in a certain manner, is eaten by the inhabitants, and called *laver*, or *black butter*.

PEN, a little inſtrument, uſually formed of a quill, ſerving to write withal.

Pens are alſo ſometimes made of ſilver, braſs, or iron.

Dutch PENS, are made of quills that have paſſed thro' hot aſhes, to take off the groſſer fat and moiſture, and render them more tranſparent.

Fountain PEN, is a pen made of ſilver, braſs, &c. contrived to contain a conſiderable quantity of ink, and let it flow out by gentle degrees, ſo as to ſupply the writer a long time without being under the neceſſity of taking freſh ink.

The fountain-pen is compoſed of ſeveral pieces, as in Plate CCXXXII. fig. 3. where the middle piece F carries the pen, which is ſcrewed into the inſide of a little pipe, which again is ſoldered to another pipe of the ſame bigneſs as the lid G; in which lid is ſoldered a male ſcrew, for ſcrewing on the cover, as alſo for ſtopping a little hole at the place, and hindering the ink from paſſing through it. At the other end of the piece F is a little pipe, on the outſide of which the top-cover H may be ſcrewed. In the cover there goes a port-crayon, which is to be ſcrewed into the laſt-mentioned pipe, in order to ſtop the end of the pipe, into which the ink is to be poured by a funnel. To uſe the pen, the cover G muſt be taken off, and the pen a little ſhaken, to make the ink run more freely.

PEN, or *Penſtock*. See PENSTOCK.

PENANCE, a puniſhment, either voluntary or impoſed by authority, for the faults a perſon has committed. Penance is one of the ſeven ſacraments of the Romiſh church. Beſides faſting, alms, abſtinence, and the like, which are the general conditions of penance, there are others of a more particular kind; as the repeating a certain number of ave-marys, paternoſters, and credos, wearing a hair-ſhirt, and giving one's ſelf a certain number of ſtripes. In Italy and Spain it is uſual to ſee Chriſtians almoſt naked, loaded with chains and a croſs, and laſhing themſelves at every ſtep.

PENATES, in Roman antiquity, a kind of tutelar deities, either of countries or particular houſes; in which laſt ſenſe they differed in nothing from the lares. See LARES.

The penates were properly the tutelar gods of the Trojans, and were only adopted by the Romans, who gave them the title of *penates*.

PENCIL, an inſtrument uſed by painters for laying on their colours. Pencils are of various kinds, and made of various materials; the larger ſorts are made of boars briſtles, the thick ends of which are bound to a ſtick, bigger or leſs, according to the uſes they are deſigned for: theſe, when large, are called *bruſhes*. The finer ſorts of pencils are made of camels, badgers, and ſquirrels hair, and of the down of ſwans; theſe are tied at the upper end with a piece of ſtrong thread, and incloſed in the barrel of a quill.

All good pencils, on being drawn between the lips, come to a fine point.

PENCIL, is alſo an inſtrument uſed in drawing, writing, &c. made of long pieces of black-lead, or red-chalk, placed in a groove cut in a ſlip of cedar; on which other pieces of cedar being glued, the whole is planed round, and one of the ends being cut to a point, it is fit for uſe.

Black-lead in fine powder, ſtirred into melted ſulphur, unites with it ſo uniformly, and in ſuch quantity, in virtue perhaps of its abounding with ſulphur, that though the compound remains fluid enough to be poured into moulds, it looks nearly like the coarſer ſorts of black-lead itſelf. Probably the way which prince Rupert is ſaid to have had, mentioned in the third volume of Dr Birch's Hiſtory of the Royal Society, of making black-lead run like a metal in a mould, ſo as to ſerve for black-lead again, conſiſting in mixing with it ſulphur or ſulphureous bodies.

On this principle the German black-lead pencils are ſaid to be made; and many of thoſe which are hawked about by certain perſons among us are prepared in the ſame manner: their melting or ſoftening, when held in a candle, or applied to a red-hot iron, and yielding a bluiſh flame, with a ſtrong ſmell like that of burning brimſtone, betrays their compoſition; for black-lead itſelf yields no ſmell or fume, and ſuffers no apparent alteration in that heat. Pencils made with ſuch additions are of a very bad kind; they are hard, brittle, and do not caſt or make a mark freely either on paper or wood, rather cutting or ſcratching them than leaving a coloured ſtroke.

The true Engliſh pencils (which Vogel in his mineral ſyſtem, and ſome other foreign writers, imagine to be prepared alſo by melting the black-lead with ſome additional ſubſtances, and caſting it into a mould) are formed of black-lead alone, ſawed into ſlips, which are fitted into a groove made in a piece of wood, and another ſlip of wood glued over them: the ſofteſt wood, as cedar, is made choice of, that the pencil may be the eaſier cut; and a part at one end, too ſhort to be conveniently uſed after the reſt has been worn and cut away, is left unfilled with the black-lead, that there may be no waſte of ſo valuable a commodity. Theſe pencils are greatly preferable to the others, though ſeldom ſo perfect as could be wiſhed, being accompanied with ſome degree of the ſame inconveniencies, and being very unequal in their quality, on account of different ſorts of the mineral being fraudulently joined together in one pencil, the fore-part being commonly pretty good, and the reſt of an inferior kind. Some, to avoid theſe imperfections, take the finer pieces of black-lead itſelf, which they ſaw into ſlips, and fix for uſe in port-crayons: this is doubtleſs the ſureſt way of obtaining black-lead crayons, whoſe goodneſs can be depended on.

PENDANT, an ornament hanging at the ear, frequently compoſed of diamonds, pearls, and other jewels.

Pendants, in heraldry, parts hanging down from the label, to the number of three, four, five, or ſix at moſt, reſembling the drops in the Doric freeze. When they are more than three, they muſt be ſpecified in blazoning.

Pendants *of a Ship*, are thoſe ſtreamers, or long colours, which are ſplit and divided into two parts, ending in points, and hung at the head of maſts, or at the yard-arm ends.

PENDULOUS, a term applied to any thing that bends or hangs downwards.

PENDULUM, in mechanics, denotes any heavy body, ſo ſuſpended as that it may vibrate or ſwing, backwards and forwards, about ſome fixed point, by the force of gravity.

The vibrations of a pendulum are called its *oſcillations*.

Plate CCXXXII.

A pendulum, therefore, is any body, B, (fig. 2. nº 1.) ſuſpended upon, and moving about, a fixed point, A, as a centre.

The nature of a pendulum conſiſts in the following particulars: 1. The times of the vibrations of a pendulum, in very ſmall arches, are all equal. 2. The velocity of the bob, in the loweſt point, will be nearly as the length of the chord of the arch which it deſcribes in the deſcent. 3. The times of vibration in different pendulums, AB, AC, are as the ſquare roots of the times of their vibrations. 4. The time of one vibration is to the time of the deſcent, through half the length of the pendulum, as the circumference of a circle to its diameter. 5. Whence the length of a pendulum, vibrating ſeconds, will be found 39.2 inches nearly; and that of an half-ſecond pendulum 9.8 inches. 6. An uniform homogeneous body BG, (*ibid.* nº 2.) as a rod, ſtaff, &c. which is one-third part longer than a pendulum AD, will vibrate in the ſame time with it.

From theſe properties of the pendulum we may diſcern its uſe as an univerſal chronometer, or regulator of time, as it is uſed in clocks, and ſuch like machines. By this inſtrument alſo we can meaſure the diſtance of a ſhip, by meaſuring the interval of time between the fire and the ſound of the gun; alſo the diſtance of a cloud, by numbering the ſeconds or half-ſeconds between the lightning and thunder. Thus, ſuppoſe between the lightning and thunder, we number 10 ſeconds; then, becauſe ſound paſſes through 1142 feet in one ſecond, we have the diſtance of the cloud equal to 11420 feet. Again, the height of any room, or other object, may be meaſured by a pendulum vibrating from the top thereof. Thus, ſuppoſe a pendulum from the height of a room vibrates once in three ſeconds; then ſay, as 1 is to the ſquare of 3, *viz.* 9, ſo is 39.2 to 352.8 feet, the height required. Laſtly, By the pendulum we diſcover the different force of gravity on diverſe parts of the earth's ſurface; and thence the true figure of the earth.

When pendulums were firſt applied to clocks, they were made very ſhort: and, the arches of the circle being large, the time of vibration through different arches could not in that caſe be equal; to effect which, the pendulum was contrived to vibrate in the arch of a cycloid, by making it play between two ſemi-cycloids, CB, CD, (*ibid.* nº 3.) whereby it deſcribes the cycloid BE, AD; the property of which curve is, that a body vibrating in it will deſcribe all its arches, great or ſmall, in equal times.

In all that has been hitherto ſaid, the power of gravity has been ſuppoſed conſtantly the ſame. But if the ſaid power varies, the lengths of pendulums muſt vary in the ſame proportion, in order that they may vibrate in equal times; for we have ſhewn, that the ratio of the times of vibration and deſcent through half the lengths is given, and conſequently the times of vibration and deſcent through the whole length is given: But the times of vibration are ſuppoſed equal, therefore the times of deſcent through the lengths of the pendulum are equal. But bodies deſcending thro' unequal ſpaces, in equal times, are impelled by powers that are as the ſpaces deſcribed, that is, the powers of gravity are as the lengths of the pendulums.

The greateſt inconvenience attending this moſt uſeful inſtrument is, that it is conſtantly liable to an alteration of its length, from the effects of heat and cold, which very ſenſibly expand and contract all metalline bodies.

To remedy this inconvenience, the common method is by applying the bob of the pendulum with a ſcrew; ſo that it may be at any time made longer or ſhorter, according as the bob is ſcrewed downwards or upwards, aud thereby the time of its vibrations kept always the ſame. Again, if a glaſs or metalline tube, uniform throughout, filled with quickſilver, and 58.8 inches long, were applied to a clock, it would vibrate ſeconds for $39.2=\frac{2}{3}$ of 58.8): and ſuch a pendulum admits of a twofold expanſion and contraction, *viz.* one of the metal and the other of the mercury; and theſe will be at the ſame time contrary, and therefore will correct each other. For by what we have ſhewn, the metal will extend in length with heat, and ſo the pendulum will vibrate ſlower on that account. The mercury alſo will expand with heat; and ſince by this expanſion it muſt extend the length of the column upward, and conſequently raiſe the centre of oſcillation; ſo that by this means its diſtance from the point of ſuſpenſion will be ſhortened, and therefore the pendulum on this account will vibrate quicker: wherefore, if the circumſtances of the tube and mercury are ſkilfully adjuſted, the time of the clock might by this means, for a long courſe of time, continue the ſame, without any ſenſible gain or loſs.

This is the invention of the late ingenious Mr Graham, in the year 1721, who made a clock of this ſort, and compared it with one of the beſt of the common ſort for three years together, and found the errors of the former but about $\frac{1}{8}$ part of the latter; of which the reader may ſee a farther account in Phil. Tranſ. nº 393. It is what is now called *Mr Graham's quickſilver pendulum.*

In the 47th volume of the Phil. Tranſ. Mr Short gives us an account of other inventions to remedy the ſame inconvenience. Mr John Harriſon of Barrow, in Lincolnſhire, famous for his invention of a clock to find the difference of longitude at ſea, without having the leaſt knowledge of what Mr Graham had done before him, made ſeveral experiments upon wires of different metals, in order to find their different degrees of expanſion and contraction. He thought, that by a proper combination of wires of two different metals, differing conſiderably in their expanſion and contraction, he might be enabled to keep the centre of oſcillation of a pendulum always at the ſame diſtance from the point of ſuſpenſion. In conſequence of theſe experiments, he made a pendulum conſiſting of one ſteel-wire, at the end of which is the bob or weight; and on each ſide of this wire, four wires, alternately braſs and ſteel, ſo diſpoſed and contrived as to raiſe the pendulum by the ſame quantity that it is lengthened by heat, and to let down the pendulum in the ſame proportion as it is raiſed by cold.

Mr Harriſon, in his firſt machine for meaſuring time at ſea, likewiſe applied this combination of wires of braſs and ſteel, to prevent any alterations by heat and cold. And in the two machines or clocks he has ſince made for the ſame purpoſe, a like method of guarding againſt the irregularities ariſing from this cauſe is uſed.

Mr Graham alſo made a pendulum conſiſting of three bars, one of ſteel between two of braſs; and the ſteel bar acted upon a lever, ſo as to raiſe the pendulum, when lengthened by heat, and to let it down, when ſhortened by cold; but he found this clock liable to ſudden ſtarts and jerks in its motion.

The ingenious Mr Ellicott, in the ſame volume of the Tranſactions, deſcribes a pendulum of his invention, compoſed of braſs and iron, with the method of applying it, ſo as to avoid the many jerks to which the machine might be liable.

But beſides the irregularities ariſing from heat and cold, pendulum-clocks are liable to others from friction and foulneſs; to obviate which, Mr Harriſon has ſeveral excellent contrivances, whereby his clocks are almoſt entirely free from friction, and never need to be cleaned.

PENELOPE, in fabulous hiſtory, the daughter of Icarus, married Ulyſſes, by whom ſhe had Telemachus. During the abſence of Ulyſſes, who was gone to the ſiege of Troy, and who ſtaid 20 years from his dominions, ſeveral princes, charmed with Penelope's beauty, told her that Ulyſſes was dead, offered to marry her, and preſſed her to declare in their favour. She promiſed compliance on condition they would give her time to finiſh a piece of tapeſtry ſhe was weaving; but at the ſame time ſhe undid in the night what ſhe had done in the day, and by this artifice eluded their importunity till Ulyſſes's return.

PENESTICA, (Antonine), a town of the Helvetii, ſituated between the Lacus Lauſonius and Salodurum; called *Peteniſca* by Peutinger. Thought now to be *Biel*, (Cluverius); the capital of a ſmall territory in Swiſſerland.

PENEUS, (Strabo); a river running through the middle of Theſſaly, from weſt to eaſt, into the Sinus Thermaicus, between Olympus and Oſſa, near Tempe of Theſſaly, riſing in mount Pindus, (Ovid, Val. Flaccus).

PENETRALE, in Roman antiquity, properly denoted the *chapel*, conſecrated to the penates or houſehold gods.

PENICILLUS, among ſurgeons, is uſed for a tent to be put into wounds or ulcers.

PENINSULA, in geography, a portion or extent of land joining to the continent by a narrow neck or iſthmus, the reſt being encompaſſed with water. See Plate CXVI.

PENIS, in anatomy. See there, nº 371, o.

PENITENTS, an appellation given to certain fraternities of penitents diſtinguiſhed by the different ſhape and colour of their habits. Theſe are ſecular ſocieties, who have their rules, ſtatutes, and churches, and make public proceſſions under their particular croſſes or banners. Of theſe there are more than a hundred, the moſt conſiderable of which are as follows: the white penitents, of which there are ſeveral different ſorts at Rome, the moſt ancient of which was conſtituted in 1264: the brethren of this fraternity every year give portions to a certain number of young girls, in order to their being married: their habit is a kind of white ſackcloth, and on the ſhoulder is a circle, in the middle of which is a red and white croſs. Black penitents, the moſt conſiderable of which are the brethren of mercy, inſtituted in 1488, by ſome Florentines, in order to aſſiſt criminals during their impriſonment, and at the time of their death: on the day of execution, they walk in proceſſion before them, ſinging the ſeven penitential pſalms and the litanies; and after they are dead, they take them down from the gibbet and bury them: their habit is black ſackcloth. There are others whoſe buſineſs it is to bury ſuch perſons as are found dead in the ſtreets: theſe wear a death's head on one ſide of their habit. There are alſo blue, grey, red, green, and violet penitents; all which are remarkable for little elſe beſides the different colours of their habits.

Mabillon tells us, that at Turin there are a ſet of penitents kept in pay to walk through the ſtreets in proceſſion, and cut their ſhoulders with whips, &c.

PENITENTIAL, an eccleſiaſtical book retained among the Romaniſts; in which is preſcribed what relates to the impoſition of penance and the reconciliation of penitents. See PENANCE.

There are various penitentials, as the Roman penitential, that of the venerable Bede, that of pope Gregory III. &c.

PENITENTIARY, in the ancient Chriſtian church, a name given to certain preſbyters or prieſts, appointed in every church to receive the private confeſſions of the people, in order to facilitate public diſcipline, by acquainting them what ſins were to be expiated by public penance, and to appoint private penance for ſuch private crimes as were not proper to be publicly cenſured.

PENITENTIARY, at the court of Rome, is an office in which are examined and delivered out the ſecret bulls, graces, or diſpenſations relating to caſes of conſcience, confeſſions, &c.

PENITENTIARY, is alſo an officer, in ſome cathedrals, veſted with power from the biſhop to abſolve, in caſes reſerved to him. The pope has at preſent his grand penitentiary, who is a cardinal, and the chief of the other penitentiary prieſts eſtabliſhed in the church of Rome, who conſult him in all difficult caſes. He preſides in the penitentiary, diſpatches diſpenſations, abſolutions, &c. and has under him a regent and 24 proctors, or advocates of the ſacred penitentiary.

PENN (Sir William), was born at Briſtol in 1621, and inclined from his youth to maritime affairs. He was made captain at 21 years of age, rear-admiral of Ireland at 23, vice-admiral of Ireland at 25, admiral to the Streights at 29, vice-admiral of England at 31, and general in the firſt Dutch war at 32. Whence returning in 1655, he was choſen repreſentative for the town of Weymouth; and in 1660 was made commiſſioner of the admiralty and navy, governor of the town and fort of Kinſale, vice-admiral of Munſter, and a member of that provincial council. In 1664 he was choſen great captain-commander under the duke of York, and diſtinguiſhed himſelf in an engagement againſt the Dutch fleet; after which he took leave of the ſea, but continued in his other employments till 1669. He died in 1670.

PENN (William), an eminent writer among the Quakers, and the planter and legiſlator of Penſylvania, was the ſon of the above Sir William Penn, and was born at London in 1644. In 1660, he was entered a gentleman commoner of Chriſt-Church, in Oxford; but having before received an impreſſion from the preaching of one Thomas Loe a Quaker, withdrew with ſome other ſtudents from the national worſhip, and held private meetings, where they preached and prayed amongſt themſelves. This giving great offence to the heads of the college, Mr Penn, though but 16 years of age, was fined for nonconformity; and continuing his religious exerciſes, was at length expelled his college. Upon his return home, he was, on the ſame account, treated with great ſeverity by his father, who at laſt turned him out of doors; but his reſentment afterwards abating, he ſent him to France in company with ſome perſons of quality; where he continued a conſiderable time, and returned not only well ſkilled in the French language, but a polite and accompliſhed gentleman. About the year 1666, his father committed to his care a conſiderable eſtate in Ireland. Being found in one of the Quakers meetings in Cork, he, with many others, was thrown into priſon; but on his writing to the earl of Orrery, was ſoon diſcharged. However, his father being informed he ſtill adhered to his opinions, ſent for him to England, and finding him inflexible to all his arguments, turned him out of doors a ſecond time. About the year 1668, he became a public preacher among the Quakers; and that year was committed cloſe priſoner to the Tower, where he wrote ſeveral treatiſes. Being diſcharged after ſeven months impriſonment, he went to Ireland, where he alſo preached amongſt the Quakers. Returning to England, he was, in 1670, committed to Newgate for preaching in Gracechurch-ſtreet meeting-houſe, London; but being tried at the ſeſſions-houſe in the Old Bailey, he was acquitted. In September the ſame year, his father died; and being perfectly reconciled to him, left him both his paternal bleſſing and a plentiful eſtate. But his perſecutions were not yet at an end; for, in 1671, he was committed to Newgate for preaching at a meeting in Wheeler-ſtreet, London; and during his impriſonment, which continued ſix months, he alſo wrote ſeveral treatiſes. After his diſcharge, he went into Holland and Germany; and in the beginning of the year 1672, married and ſettled with his family at Rickmanſworth in Hertfordſhire. The ſame year he publiſhed ſeveral pieces; and particularly one againſt Reeve and Muggleton. In 1677, he again travelled into Holland and Germany in order to propagate his opinions; and had frequent converſations with the princeſs Elizabeth, daughter to the queen of Bohemia, and ſiſter to the the princeſs Sophia, mother to king Geo. I. In 1681, king Charles II. in conſideration of the ſervices of Mr Penn's father, and ſeveral debts due to him from the crown at the time of his deceaſe, granted Mr Penn and his heirs the province lying on the weſt ſide of the river Delaware in North America, which from thence obtained the name of *Penſylvania*. Upon this Mr Penn publiſhed a brief account of that province, with the king's patent; and propoſing an eaſy purchaſe of lands, and good terms of ſettlement for ſuch as were inclined to remove thither, many went over. Theſe having made and improved their plantations to good advantage, the governor, in order to ſecure the planters from the native Indians, appointed commiſſioners to purchaſe the land he had received from the king of the native Indians, and concluded a peace with them. The city of Philadelphia was planned and built; and he himſelf drew up the fundamental conſtitutions of Penſylvania in 24 articles. In 1681, he was elected a member of the Royal Society; and the next year he embarked for Penſylvania, where he continued about two years, and returned to England in Auguſt 1684. Upon the acceſſion of king James to the throne, he was taken into a great degree of favour with his Majeſty, which expoſed him to the imputation of being a Papiſt; but from which he fully vindicated himſelf. However, upon the Revolution, he was examined before the council, in 1688, and obliged to give ſecurity for his appearance on the firſt day of next term, which was afterwards continued. He was ſeveral times diſcharged and examined; and at length warrants being iſſued out againſt him, he was obliged to conceal himſelf

ſelf for two or three years. Being at laſt permitted to appear before the king and council, he repreſented his innocence ſo effectually that he was acquitted. In Auguſt 1699, he, with his wife and family, embarked for Penſylvania; whence he returned in 1701, in order to vindicate his proprietary right, which had been attacked during his abſence. Upon queen Anne's acceſſion to the crown, he was in great favour with her, and was often at court. But, in 1707, he was involved in a lawſuit with the executors of a perſon who had been formerly his ſteward; and, though many thought him aggrieved, the court of chancery did not think proper to relieve him; upon which account he was obliged to live within the rules of the Fleet for ſeveral months, till the matter in diſpute was accommodated. He died in 1718. Mr Penn's friendly and pacific manner of treating the Indians produced in them an extraordinary love for him and his people; ſo that they have maintained a perfect amity with the Engliſh in Penſylvania ever ſince. He was the greateſt bulwark of the Quakers; in whoſe defence he wrote numberleſs pieces. Beſides the above works, he wrote a great number of others; the moſt eſteemed of which are, 1. His Primitive Chriſtianity revived. 2. His defence of a paper, intitled *Goſpel Truths, againſt the Exceptions of the Biſhop of Cork*. 3. His Perſuaſive to Moderation. 4. His Good Advice to the Church of England, Roman Catholic, and Proteſtant diſſenter. 5. The Sandy Foundation ſhaken. 6. No Croſs, no Crown. 7. The great Caſe of Liberty of Conſcience debated. 8. The Chriſtian Quaker and his Teſtimony ſtated and vindicated. 9. A Diſcourſe of the general Rule of Faith and Practice, and Judge of Controverſy. 10. England's Preſent Intereſt conſidered. 11. An Addreſs to Proteſtants. 12. His Reflections and Maxims. 13. His Advice to his Children. 14. His Riſe and Progreſs of the People called *Quakers*. 15. A Treatiſe on Oaths. Moſt of theſe have paſſed ſeveral editions, ſome of them many. The letters between William Penn and Dr Tillotſon, and William Penn and William Popple, Eſq; together with Penn's letters to the princeſs Elizabeth of the Rhine and the counteſs of Hornes, as alſo one to his wife on his going to Penſylvania, are inſerted in his works, which were firſt collected and publiſhed in 2 vols folio; and the parts ſince ſelected and abridged into 1 vol. folio, are very much and deſervedly admired for the good ſenſe they contain.

PENNI (Giovanni Franciſco), born at Florence in 1488, was the diſciple of Raphael, who obſerving his genius and integrity, intruſted his domeſtic concerns entirely to his management; by which means he got the appellation of *il fatore*, or the "ſteward," which he retained ever after. The genius of Penni was univerſal; but his greateſt pleaſure was in painting landſcapes and buildings: he was an excellent deſigner, and coloured extremely well in oil, diſtemper, and freſco. He painted portraits in an exquiſite ſtyle, and had ſuch happy natural talents, that Raphael left him heir to his fortune in partnerſhip with Julio Romano his fellow-diſciple. After Raphael's death, Penni painted many pictures at Rome, particularly in the palace of Chigi, ſo exactly in the ſtyle of his maſter, that they might not undeſervedly have been imputed to him: he finiſhed, in conjunction with Julio and Pierino del Vaga, the celebrated deſigns of the battles of Conſtantine, and others, which Raphael had left imperfect; but differing with them about a copy of the tranſfiguration, which the pope intended for the king of France, they ſeparated. Penni went to Naples; but the air of that country diſagreeing with his conſtitution, he died ſoon after in 1528. He had a brother called *Lucca Penni*, who worked at Genoa and other parts of Italy in conjunction with Pierino del Vaga, who married his ſiſter; he went thence to England, where he worked for Henry VIII. and for ſeveral merchants; was employed by Francis I. at Fontainbleau; but at laſt quitted the pencil, and devoted himſelf to engraving.

PENNY, or PENY, in commerce, an ancient Engliſh coin, which had formerly conſiderable courſe; but is now generally dwindled into an imaginary money, or money of account. Camden derives the word from the Latin *pecunia*, "money."

The ancient Engliſh penny, penig, or pening, was the firſt ſilver coin ſtruck in England; nay, and the only one current among our Saxon anceſtors: as is agreed by Camden, Spelman, Dr Hicks, &c.

The penny was equal in weight to our three-pence; five of them made one ſhilling, or ſcilling Saxon; 30 a mark or mancuſe, equal to our 7*s*. 6*d*.

Till the time of king Edw. I. the penny was ſtruck with a croſs, ſo deeply indented in it that it might be eaſily broke, and parted, on occaſion, into two parts, thence called *half-pennies*; or into four, thence called *fourthings*, or *farthings*.—But that prince coined it without indenture; in lieu of which, he firſt ſtruck round half-pence and farthings.

He alſo reduced the weight of the penny to a ſtandard; ordering that it ſhould weigh 32 grains of wheat, taken out of the middle of the ear.—This penny was called the *penny ſterling*.—Twenty of theſe pence were to weigh an ounce; whence the penny became a weight as well as a coin. See STERLING and PENNY-*Weight*.

The penny ſterling is now nigh diſuſed as a coin; and ſcarce ſubſiſts, but as a money of account, containing the 12th parth of a ſhilling, or the 140th part of a pound.

PENNY, in ancient ſtatutes, &c. is uſed for all ſilver money.

And hence the *ward-penny*, *aver-penny*, *hundred-penny*, *tithing-penny*, and *brothal-penny*.

PENNY-*Weight*, a Troy weight, containing 24 grains; each grain weighing a grain of wheat gathered out of the middle of the ear, well dried. The name took its riſe hence, that this was anciently the weight of one of our ancient ſilver pennies. See PENNY.

Twenty of theſe penny-weights make an ounce Troy.

PENRITH, an ancient town of the county of Cumberland in England, ſeated under a hill called *Penrith-Fell*, near the rivers Eimont and Lowther. It is a great thoroughfare for travellers; but has little other trade except tanning, and a ſmall manufacture of checks. Formerly it had a caſtle, but it is now in ruins. In the church-yard is a monument of great antiquity, conſiſting of two ſtone-pillars 11 feet 6 inches high, and five in circumference in the lower part, which is rounded; the upper is ſquare, and tapers to a point; in the ſquare part is ſome fret-work, and the relievo of a croſs; and on the interior ſide of one is the faint repreſentation of ſome animal. Both theſe ſtones are mortiſed at their lower part into a round one: they are about 15 feet aſunder, and the ſpace between them is incloſed on each ſide with two very large but thin ſemicircular ſtones; ſo that there is left between pillar and pillar a walk of two feet in breadth. Two of theſe leſſer ſtones are plain, the others have certain figures, at preſent ſcarce intelligible. Not far from theſe pillar's is another called the *giant's thumb*, five feet eight inches high, with an expanded head, perforated on both ſides; from the middle the ſtone riſes again into a leſſer head, rounded at top; but no part has a tendency to the figure of a croſs, being in no part mutilated. W. Long. 3. 16. N. Lat. 54. 35.

PENRYN, a town of Cornwal in England, ſeated on a creek of Falmouth-haven. It conſiſts of about 300 houſes, and the ſtreets are broad and paved. It ſends two members to parliament. W. Long. 5. 35. N. Lat. 50. 23.

PENSACOLA, a ſettlement in North America, ſituated at the mouth of a river on the gulf of Mexico. It was eſtabliſhed by the French, and ceded to Great Britain in 1763; but has lately been taken by the Spaniards. W. Long. 87. 20. N. Lat. 30. 22.

PENSILVANIA, one of the principal Britiſh colonies in North America, had its name from the famous Quaker William Penn, ſon of Sir William, commander of the Engliſh fleet in Oliver Cromwell's time, and in the beginning of Ch. II.'s reign, who obtained a grant of it in the year 1679; is bounded on the eaſt by Delaware bay and river, and the Atlantic ocean; on the north by the country of the Iroquois, or five nations; and on the ſouth and weſt by Maryland. Its extent, from north to ſouth, is about 200 miles; but its breadth varies greatly, from 15, and even leſs, to near 200.

The air in Penſylvania is ſweet and clear. The fall, or autumn, begins about the 20th of October, and laſts till the beginning of December, when the winter ſets in, which continues till March, and is ſometimes extremely cold and ſevere; but the air is then generally dry and healthy. The river Delaware, though very broad, is often frozen over. From March to June, that is, in the ſpring, the weather is more inconſtant than in the other ſeaſons. In the months of July, Auguſt, and September, the heats would be almoſt intolerable, if they were not mitigated by frequent cool breezes. The wind, during the ſummer, is generally ſouth-weſt; but in the winter blows for the moſt part from the north-weſt, over the ſnowy frozen mountains and lakes of Canada, which occaſions the exceſſive cold during that ſeaſon.

As to the face of this country, towards the coaſt, like the adjacent colonies, it is flat, but riſes gradually to the Apalachian mountains on the weſt.

The chief rivers are three, Delaware, Saſquahanna, and Skoolkil. The Delaware, riſing in the country of the Iroquois, takes its courſe ſouthward; and after dividing this province from that of New Jerſey, falls into the Atlantic ocean between the promontories or capes May and Henlopen, forming at its mouth a large bay, called, from the river, *Delaware Bay*. This river is navigable above 200 miles. The Saſquahanna riſes alſo in the country of the Iroquois, and running ſouth through the middle of the province, falls into the bay of Cheſapeake, being navigable a great way for large ſhips. The Skoolkil has its ſource in the ſame country as the other two, and alſo runs ſouth, almoſt parallel to them; till at length turning to the eaſtward, it falls into the Delaware at the city of Philadelphia. It is navigable for boats above 100 miles. Theſe rivers, with the numerous creeks and harbours in Delaware bay, capable of containing the largeſt fleets, are extremely favourable to the trade of this province.

As to the ſoil, produce, and traffic of Penſylvania, we refer the reader to what has been ſaid on theſe heads under NEW-YORK and the JERSEYS, which is equally applicable to this province; and if there is any difference, it is on the ſide of this province. They have ſome rice here, but no great quantities; and ſome tobacco, but it is not equal to that of Virginia. From the premiums offered by the ſociety of arts in London, it appears that the ſoil and climate of this province are looked upon as proper for the cultivation of ſome ſpecies of vines. The trade carried on from hence and the other colonies to the French and Dutch iſlands and Surinam, was greatly to the diſadvantage of Britain, and very deſtructive to the ſugar-colonies: for they take molaſſes, rum, and other ſpirits, with a great many European goods, from theſe foreigners; carrying them horſes, proviſions, and lumber in return, without which the French could not carry on their ſugar-manufactures to that advantage they do.

New-York, the Jerſeys, and Penſylvania, were diſcovered, with the reſt of the continent of North America, in the reign of Henry VII. by Sebaſtian Cabot, for the crown of England; but Sir Walter Raleigh was the firſt adventurer that attempted to plant colonies on theſe ſhores, in the reign of Queen Eliſabeth; and, in honour of that princeſs, gave all the eaſtern coaſt of North America the name of *Virginia*. Mr Hudſon, an Engliſhman, ſailing to that part of the coaſt which lies between Virginia and New England, in the beginning of the reign of James I. and being about to make a ſettlement at the mouth of of Hudſon's river, the Dutch gave him a ſum of money to diſpoſe of his intereſt in this country to them. In the year 1608 they began to plant it; and, by virtue of this purchaſe, laid claim to all thoſe countries which are now denominated *New York*, *New Jerſey*, and *Penſylvania*; but there remaining ſome part of this coaſt which was not planted by the Hollanders, the Swedes ſent a fleet of ſhips thither, and took poſſeſſion of it for that crown; but the Dutch having a ſuperior force in the neighbourhood, compelled the Swedes to ſubmit to their dominion, allowing them, however, to enjoy the plantations they had ſettled. The Engliſh not admitting that either the Dutch or Swedes had any right to countries firſt diſcovered and planted by a ſubject of England, and part of them at that time poſſeſſed by the ſubjects of Great Britain, under charter from Queen Eliſabeth and king James I. king Charles II. during the firſt Dutch war in 1664, granted the countries of New York, the Jerſeys, and Penſylvania, of which the Dutch had uſurped the poſſeſſion, to his brother James Duke of York; and Sir Robert Carr being ſent over with a ſquadron of men of war and land-forces, and ſummoning the Dutch governor of the city of New Amſterdam, now New York, to ſurrender, he thought fit to obey the ſummons, and yield that capital to the Engliſh: the reſt of the places in the poſſeſſion of the Dutch and Swedes

Penſilvania.

followed his example; and theſe countries were confirmed to the Engliſh by the Dutch at the next treaty of peace between the two nations. The Duke of York afterwards parcelled them out to under proprietors; ſelling, in particular, to William Penn the elder, in 1683, the town of Newcaſtle, *alias* Delaware, and a diſtrict of twelve miles round the ſame; to whom, his heirs and aſſigns, by another deed of the ſame date, he made over all that tract of land from 12 miles ſouth of Newcaſtle to the Whore-hills, otherwiſe called *Cape Henlopen*, now divided into the two counties of Kent and Suſſex, which, with Newcaſtle diſtrict, are commonly known by the name of the *Three Lower counties upon Delaware River*. All the reſt of the under-proprietors, ſome time after, ſurrendered their charters to the crown; whereby New York and the Jerſeys became Royal governments; but Penn retained that part of the country which had been ſold him by the Duke of York, together with what had been granted to him before in 1680-1, which now conſtitutes the province of Penſylvania. As ſoon as Penn had got his patent, he began to plant the country. Thoſe who went over from England were generally diſſenters and quakers, whoſe religion is eſtabliſhed by law here, but with a toleration of all other proteſtant ſects. The Dutch and Swedes, who were ſettled here before Mr Penn became proprietor, chooſing ſtill to reſide in this country, as they did in New York and the Jerſeys, obtained the ſame privileges as the reſt of his majeſty's ſubjects; and their deſcendents are now in a manner the ſame people with the Engliſh, ſpeaking their language, and being governed by their laws and cuſtoms. Mr Penn, however, not ſatisfied with the title granted him by king Charles II. and his brother, bought the lands alſo of the Indians for a valuable conſideration, or what they eſteemed ſuch, (though 20 miles were purchaſed, at firſt, for leſs than an acre about Philadelphia would pay now), paying them in cloth, tools, and utenſils, to their entire ſatisfaction; for they had not hands to cultivate the hundredth part of their lands, and if they could have raiſed a product, there was nobody to buy: the purchaſe, therefore, was all clear gain to them; and, by the coming of the Engliſh, their peltry trade became ſo profitable, that they ſoon found their condition much altered for the better; and are now as well clothed and fed as the European peaſantry in many places.

Penſylvania is one of the moſt flouriſhing colonies in North America, having never had any quarrel with the natives. Whenever they deſire to extend their ſettlements, they purchaſe new lands of the ſachems, never taking any by force; but the Indians now ſet a very high price upon their lands, in compariſon of what they did at firſt, and will hardly part with them at any rate. In an eſtimate of the proprietary eſtate of the province, publiſhed above thirty years ago, we find, that the proprietaries, who alone can purchaſe lands here from the natives, had bought ſeven millions of acres for no more than 750 l. Sterling, which the proprietaries afterwards ſold at the rate of 15 l. for every 100 acres. The Indian council at Onandago, however, diſapproved of their deputies parting with ſo much land; and, in the year 1755, obliged the proprietaries to re-convey great part of the ſame to the Indians.

Penſion, Penſionary.

A diſpute ſubſiſted a long time between the proprietaries of this province and Lord Baltimore, proprietary of Maryland, about the right to certain lands; which was at laſt amicably adjuſted, though greatly in favour of the Penns.

About the year 1704 there happened ſome alteration in the conſtitution of the province. The eſtabliſhment that took place, and ſubſiſted till the preſent troubles broke out, conſiſted of a governor, council, and aſſembly, each with much the ſame power and privileges as in the neighbouring colony of New York. The lieutenant-governor and council were appointed by the proprietors Thomas and Richard Penn, with his majeſty's approbation; but if the laws enacted here were not repealed within ſix months after they had been preſented to the king for his approbation or diſallowance, they were not repealable by the crown after that time.

Penſylvania is divided into ſeven counties; four of which are called the *Upper*, and three the *Lower*. Of the upper, viz. Buckingham, Philadelphia, Cheſter, and Lancaſter, the three firſt are the lands included in king Charles II's grant, and deſigned *Penſylvania;* the lower, viz. thoſe of Newcaſtle, Kent, and Suſſex, were called *Nova Belgia* before the duke of York ſold them, as we obſerved above, to Mr Penn. The upper counties end at Marcus Hook, four miles below Cheſter Town, where the lower begin, and run along the coaſt near 100 miles. Each of theſe counties had a ſheriff, with a quarterly and monthly ſeſſion, and aſſizes twice a-year.

PENSION, a ſum of money paid annually for ſervices or conſiderations already paſt. The yearly payment of each member to the houſes of the inns of courts are likewiſe named *penſions*; and the yearly aſſembly of the ſociety of Gray's Inn, to conſult on the affairs of the houſe, is alſo called a *penſion*.

PENSIONARY, or PENSIONER, a perſon who has an appointment, or yearly ſum, payable during life, by way of acknowledgment, charged on the eſtate of a prince, company, or particular perſon.

Grand PENSIONARY, an appellation given to the firſt miniſter of the States of Holland. The grand penſionary is chairman in the aſſemblies of the ſtates of that province: he propoſes the matters to be conſulted on; collects the votes; forms and pronounces the reſolutions of the ſtates; opens letters; confers with foreign miniſters, &c. His buſineſs is alſo to inſpect the finances, to maintain the authority of the ſtates, and to ſee that the laws are obſerved; and he is perpetual deputy of the ſtates-general of the United Ptovinces. His commiſſion is, however, given him only for five years; after which it is deliberated whether or no it ſhall be renewed; but there is no inſtance of its being revoked; therefore death only puts an end to the functions of this important miniſter.

PENSIONARY, is alſo the firſt miniſter of the regency of each city in Holland. His office is to give his advice in affairs relating to the government, either of the ſtate in general, or of the city in particular; and in aſſemblies of the ſtates of the province, he is ſpeaker in behalf of his city. The function, however, of theſe penſionaries is not every where alike; in ſome cities they only give their advice, and are never found in aſſemblies of the magiſtrates, except when expreſsly called thither: in others they attend conſtantly; and in others they make the propoſitions on the part of the burgo-maſters, draw up their concluſions, &c. They are called *penſionaries*, becauſe they receive an appointment or penſion.

PENSIONER, in general, denotes a perſon who receives a penſion, yearly ſalary, or allowance. Hence,

The Band of Gentlemen-PENISONERS, the nobleſt ſort of guard to the king's perſon, conſiſts of 40 gentlemen, who receive a yearly penſion of 100 l.

This honourable band was firſt inſtituted by king Henry VIII. and their office is to attend the king's perſon, with their battle-axes, to and from his chapel-royal, and to receive him in the preſence-chamber, or coming out of his privy-lodgings: they are alſo to attend at all great ſolemnities, as coronations, St George's feaſt, public audiences of embaſſadors, at the ſovereign's going to parliament, &c.

They are each obliged to keep three double horſes and a ſervant, and ſo are properly a troop of horſe. They wait half at a time quarterly; but on Chriſtmas-day, Eaſter-day, Whitſunday, &c. and on extraordinary occaſions, they are all obliged to give their attendance. They have likewiſe the honour to carry up the ſovereign's dinner on the coronation-day and St George's feaſt; at which times the king or queen uſually confer the honour of knighthood on two ſuch gentlemen of the band as their captain preſents.

Their arms are gilt battle-axes; and their weapons, on horſe-back, in time of war, are curaſſiers-arms, with ſword and piſtols. Their ſtandard in time of war is, argent, a croſs gules. Their captain is always a nobleman, who has under him a lieutenant, a ſtandard-bearer, a clerk of the check, ſecretary, paymaſter, and harbinger.

PENSTOCK, a ſluice or flood-gate, ſerving to retain or let go at pleaſure the water of a mill-pond, or the like.

PENTACROSTIC, in poetry, a ſet of verſes ſo diſpoſed, as that there are always five acroſtics of the ſame name, in five diviſions of each verſe. See ACROSTIC.

PENTÆDROSTYLA, in natural hiſtory, the name of a genus of ſpars. See SPAR. The bodies of this genus are ſpars in form of Pentagonal columns, terminated by pentangular pyramids at one end, and regularly affixed at the other to ſome ſolid body.

PENTAGON, in geometry, a figure of five ſides and five angles. See GEOMETRY.

In fortification, pentagon denotes a fort with five baſtions.

PENTAGRAPH, an inſtrument deſigned for drawing figures in what proportion you pleaſe, without any ſkill in the art.

It conſiſts of four braſs or wooden rulers, two of them from 15 to 18 inches long, and the other two half that length. At the ends and middle of the long rulers, as alſo at the ends of the ſhorter, are holes, upon the exact fixing of which the perfection of the inſtrument chiefly depends. Thoſe in the middle of the long rulers are to be at the ſame diſtance from thoſe at the ends of the long ones, and thoſe of the ſhort ones ſo as to form a parallelogram. It is fitted together by a large pillar *a*, having at one end a ſcrew and nut, whereby the long rulers are joined, and at the other a little knot for the inſtrument to ſlide on: *b* is a rivet with a ſcrew and nut, wherewith each ſhort ruler is faſtened to the middle of each long one; *c* is a pillar, one end whereof being hollowed into a ſcrew, has a nut fitted to it: at the other end is a worm to ſcrew into the table when the inſtrument is to be uſed; it joins the ends of the two ſhort rulers: *d* is a pen or pencil ſcrewed into a little pillar: *e* is a braſs point moderately blunt, ſcrewed likewiſe into a little pillar.

Plate CCXXXIV fig. 3.

Uſe of the Pentagraph. 1. To copy a deſign in the ſame ſcale as the original. Screw the worm *c* into the table; lay a paper under the pencil *d* now placed at *f*, and the deſign under the point *e* now placed at *g*; then conducting the point over the ſeveral lines of the deſign, the pencil *f* will draw the ſame on the paper. 2. If the deſign is to be reduced into a half, &c. the worm muſt be placed at the end of the long ruler *d*, and the paper and pencil in the middle. In this ſituation conduct the braſs point as before, and the pencil will draw its copy in the proportion required, the pencil here moving through half the length that the point does. On the contrary, if the deſign is to be enlarged one half, the braſs point, with the deſign, muſt be placed in the middle at *c*, the pencil and paper at the end of the long ruler, and the worm at the other.

2. To enlarge and reduce in other proportions, there are holes drilled at equal diſtances on each ruler; namely, all along the ſhort ones, and half-way up the long ones, for placing of the braſs point, pencil, and worm, in a right line therein; that is, if the piece carrying the point be put in the third hole, the two other pieces muſt be put in its third hole. If then the point and deſign be placed at any hole of the ſhort ruler, which forms the angle therewith, the copy will be leſs than half the original. On the contrary, if it be placed at one of the holes of that ſhort ruler which is parallel to the long ruler, the copy will be greater than half the original. Few of theſe inſtruments will do any thing but ſtraight lines, and many of them not even thoſe.

PENTAMETER, in ancient poetry, a kind of verſe, conſiſting of five feet, or metres, whence the name. The two firſt feet may be either dactyls or ſpondees at pleaſure; the third is always a ſpondee; and the two laſt anapeſtes: ſuch is the following verſe of Ovid.

1 2 3 4 5
Carmini|bus vi|ves tem|pus in o|mne meis.

A pentameter verſe ſubjoined to an hexameter, conſtitutes what is called *elegiac*. See ELEGIAC.

PENTANDRIA, (from πεντε, "five," and ανηρ, "a man or huſband"); the name of the fifth claſs in Linnæus's ſexual method, conſiſting of plants which have hermaphrodite flowers, with five ſtamina or male organs. See BOTANY, p. 1296.

PENTAPOLIS, (Wiſdom x.) the five cities of the plain in Paleſtine, all deſtroyed by fire from heaven, except Zoar.

PENTAPOLIS, (Ptolemy); a diſtrict of Cyrenaica; ſituate on the Mediterranean; denominated from its five cities; namely, *Berenice*, *Arſinoe*, *Ptolemais*, *Cyrene*, and *Apollonia*.

PENTAPOLIS *of the Philiſtines*, (Joſephus); taking name from five principal cities, Gaza, Gath, Aſcalon, Azotus, and Ekron.

PENTAPOLIS, (Herodotus); five cities of Doris, a diſtrict of the Hither Aſia; namely, Camirus, Cnidus, Ccs, Jalyſus, and Lindus, (Scholiaſt on Theocritus).

PENTAPETALOUS, an appellation given to flowers, which conſiſt of five petals or leaves.

PENTAPETES, in botany, a genus of the decandria order, belonging to the monodelphia claſs of plants. There is but one ſpecies known in the gardens of this country, viz. the phœnicia, with halbert-pointed, ſpear-ſhaped, ſawed leaves. It is an annual plant, a native of India, and riſes to the height of two or three feet; adorned with fine ſcarlet flowers, conſiſting of one petal cut into five ſegments. In the centre of the flower ariſes a ſhort thick column, to which adhere 15 ſhort ſtamina. It is a tender plant, and muſt be brought up in the hot-houſe.

PENTATEUCH, an appellation given to the firſt five books of the Old Teſtament, *viz.* Geneſis, Exodus, Leviticus, Numbers, and Deuteronomy.

PENTATHLON, in antiquity, a general name for the five exerciſes performed at the Grecian games, *viz.* wreſtling, boxing, leaping, running, and playing at the diſcus.

PENTECOST, a ſolemn feſtival of the Jews; ſo called becauſe it was celebrated on the 50th day after the 16th of the month Niſan, which was the ſecond day of the paſſover. See PASSOVER.

The feaſt of Pentecoſt was inſtituted in memory of the law's being given on the 50th day after the Iſraelites came out of Egypt. It was on the feaſt of Pentecoſt that the Holy Ghoſt miraculouſly deſcended on the apoſtles. See WHITSUNDAY.

PENTHESILEA, queen of the Amazons, ſucceeded Orythia, and gave proofs of her courage at the ſiege of Troy, where ſhe was killed by Achilles. Pliny ſays that ſhe invented the battle-ax.

PENULTIMA, or PENULTIMATE *Syllable*, in grammar, denotes the laſt ſyllable but one of a word; and hence the antipenultimate ſyllable is the laſt but two, or that immediately before the penultima.

PENUMBRA, in aſtronomy, a partial ſhade obſerved between the perfect ſhadow and the full light in an eclipſe. It ariſes from the magnitude of the ſun's body; for were he only a luminous point, the ſhadow would be all perfect; but, by reaſon of the diameter of the ſun, it happens, that a place which is not illuminated by the whole body of the ſun, does yet receive rays from a part thereof.

PEPIN DE HERISTAL, or LE GROS, mayor of the palace under Clovis III. Childebert, and Dagobert. The power of theſe mayors in France was ſo great, that they left the ſovereign only the empty title, and in the end ſeized on the throne itſelf.

PEPIN *le Brief*, or *le Petit*, grandſon to Pepin le Gros, and firſt king of the ſecond race of French monarchs, was mayor of the palace to Childeric III. a weak prince: he contrived to confine him and his ſon Thierri in different monaſteries; and then, with the aſſiſtance of Pope Stephen III. he uſurped the ſovereign power. He died in 768, aged 54.

PEPPER, PIPER, in natural hiſtory, an aromatic berry of a hot dry quality, chiefly uſed in ſeaſoning. We have three kinds of pepper at preſent uſed in the ſhops, the black, the white, and the long pepper.

Black pepper is the fruit of the piper, and is brought from the Dutch ſettlements in the Eaſt Indies. See PIPER.

The common white pepper is factitious, being prepared from the black in the following manner: they ſteep this in ſea-water, expoſed to the heat of the ſun for ſeveral days, till the rind or outer bark looſens; they then take it out, and, when it is half dry, rub it till the rind falls off; then they dry the white fruit, and the remains of the rind blow away like chaff. A great deal of the heat of the pepper is taken off by this proceſs, ſo that the white kind is more fit for many purpoſes than the black. However, there is a ſort of native white pepper produced on a ſpecies of the ſame plant; which is much better than the factitious, and indeed little inferior to the black.

The long pepper is a dried fruit, of an inch or an inch and an half in length, and about the thickneſs of a large gooſe-quill: it is of a browniſh grey colour, cylindrical in figure, and ſaid to be produced on a plant of the ſame genus.

Pepper is principally uſed by us in food, to aſſiſt digeſtion; but the people in the Eaſt-Indies eſteem it as a ſtomachic, and drink a ſtrong infuſion of it in water by way of giving them an appetite: they have alſo a way of making a fiery ſpirit of fermented freſh pepper, with water which they uſe for the ſame purpoſes. They have alſo a way of preſerving the common and long pepper in vinegar, and eating them afterwards at meals.

Jamaica PEPPER, or *Pimento*. See PIMENTO.

PEPPER-*Mint*. See MENTHA.

PEPPER-*Water*, a liquor prepared in the following manner, for microſcopical obſervations: put common black pepper, groſsly powdered, into an open veſſel ſo as to cover the bottom of it half an inch thick, and put to it rain or river-water, till it covers it an inch; ſhake or ſtir the whole well together at the firſt mixing, but never diſturb it afterwards: let the veſſel be expoſed to the air uncovered; and in a few days there will be ſeen a pellicle or thin ſkin ſwimming on the ſurface of the liquor, looking of ſeveral colours.

This is a congeries of multitudes of ſmall animals; and being examined by the microſcope, will be ſeen all in motion: the animals, at firſt ſight, are ſo ſmall as not to be diſtinguiſhable, unleſs to the greateſt magnifiers; but they grow daily till they arrive at their full ſize. Their numbers are alſo continually increaſing, till the whole ſurface of the liquor is full of them, to a conſiderable depth. When diſturbed, they will ſometimes all dart down to the bottom; but they ſoon after come up to the ſurface again. The ſkin appears ſooneſt in warm weather, and the animals grow the quickeſt: but in the ſevereſt cold it will ſucceed, unleſs the water freezes.

About the quantity of a pin's head of this ſcum, taken up on the nib of a new pen, or the tip of a hair-pencil, is to be laid on a plate of clear glaſs; and if applied firſt to the third magnifier, then to the ſecond, and finally to the firſt, will ſhew the different animalcules it contains, of ſeveral kinds and ſhapes as well as ſizes.

PERA, one of the ſuburbs of Conſtantinople, where ambaſſadors and Chriſtians uſually reſide. See Constantinople.

PERAMBULATOR, in ſurveying, an inſtrument for meaſuring diſtances, called alſo *pedometer*, *way-wiſer*, and *ſurveying wheel*.

Plate CCI. fig. 11.

It conſiſts of a wheel AA, two feet ſeven inches and a half in diameter; conſequently half a pole, or eight feet three inches in circumference. On one end of the axis is a nut, three quarters of an inch in diameter, and divided into eight teeth; which, upon moving the wheel round, fall into the eight teeth of another nut *c*, fixed on one end of an iron-rod Q, and thus turn the rod once round in the time the wheel makes one revolution. This rod, lying along a groove in the ſide of the carriage of the inſtrument, under the doted line, has at its other end a ſquare hole, into which is fitted the end *b* of a ſmall cylinder P. This cylinder is diſpoſed under the dial-plate of a movement, at the end of the carriage B, in ſuch a manner as to be moveable about its axis: its end *a* is cut into a perpetual ſcrew, which falling into the 32 teeth of a wheel perpendicular thereto, upon driving the inſtrument forward, that wheel makes a revolution each 16th pole. On the axis of this wheel is a pinion with ſix teeth, which, falling into the teeth of another wheel of 60 teeth, carries it round every 160th pole, or half a mile.

This laſt wheel, carrying a hand or index round with it over the diviſions of a dial-plate, whoſe outer limb is divided into 160 parts, correſponding to the 160 poles, points out the number of poles paſſed over. Again, on the axis of this laſt wheel is a pinion, containing 20 teeth, which falling into the teeth of a third wheel which hath 40 teeth, drives it once round in 320 poles, or a mile. On the axis of this wheel is a pinion of 12 teeth, which, falling into the teeth of a fourth wheel having 72 teeth, drives it once round in 12 miles.

This fourth wheel, carrying another index over the inner limb of the dial-plate, divided into 12 for miles, and each mile ſubdivided into halves, quarters, and furlongs, ſerves to regiſter the revolutions of the other hand, and to keep account of the half miles and miles paſſed over as far as 12 miles.

The uſe of this inſtrument is obvious from its conſtruction. Its proper office is in the ſurveying of roads and large diſtances, where a great deal of expedition, and not much accuracy, is required. It is evident, that driving it along and obſerving the hands, has the ſame effect as dragging the chain and taking account of the chains and links.

Its advantages are its hardineſs and expedition; its contrivance is ſuch, that it may be fitted to the wheel of a coach, in which ſtate it performs its office, and meaſures the road without any trouble at all.

PERCA, the Perch; a genus of fiſhes belonging to the order of thoracici. The head is furniſhed with ſcaly and ſerrated opercula; there are ſeven rays in the membrane of the gills; and the fins on the back are prickly. There are 38 ſpecies, principally diſtinguiſhed by peculiarities in the back-fin. The moſt remarkable are,

1. The fluviatilis, or common perch, hath a deep body, very rough ſcales, and the back much arched. The colours are beautiful; the back and part of the ſides being of a deep green, marked with five broad black bars pointing downwards; the belly is white, tinged with red; the ventral fins of a fine ſcarlet; the anal fins and tail of the ſame colour, but rather paler. In a lake called *Llyn Raithlyn*, in Merionethſhire in Wales, is a very ſingular variety of this fiſh: the back part is quite hunched, and the lower part of the backbone next the tail ſtrangely diſtorted: in colour and other reſpects it reſembles the common perch, which are as numerous in this lake as the deformed fiſh. They are not peculiar to this water; for Linnæus takes notice of them in a lake at Fahlun in his country. It is ſaid that they are alſo met with in the Thames near Marlow.

The perch was much eſteemed as food by the Romans, nor is it leſs admired at preſent as a firm and delicate fiſh; and the Dutch are particularly fond of it when made into a diſh called *water-ſouchy*. It is a gregarious fiſh, and loves deep holes and gentle ſtreams; is exceedingly voracious, and an eager biter: if the angler meets with a ſhoal of them, he is ſure of taking every one.—It is a common notion that the pike will not attack this fiſh, on account of the ſpiny fins which the perch erects on its approach. This may be true of large fiſh; but it is well known that ſmall perches are the moſt tempting bait which can be laid for the pike. The perch is very tenacious of life, and has been known to ſurvive a journey of 60 miles in dry ſtraw. It ſeldom grows to a large ſize, though Mr Pennant mentions one that weighed nine pounds; but this, he tells us, is very uncommon.

2. The labrax, or baſſe, is a very voracious, ſtrong, and active fiſh. Ovid calls them *rapidi lupi*, a name continued to them by after-writers; and they are ſaid to grow to the weight of fifteen pounds. The irides are ſilvery; the mouth large; the teeth are ſituated in the jaws, and are very ſmall: in the roof of the mouth is a triangular rough ſpace, and juſt at the gullet are two others of a roundiſh form. The ſcales are of a middling ſize, are very thick ſet, and adhere cloſely. The body is formed ſomewhat like that of a ſalmon. The colour of the back is duſky, tinged with blue. The belly white. In young fiſh the ſpace above the ſide line is marked with ſmall black ſpots.—It is eſteemed a very delicate fiſh.

3. The perca marina, or ſea-perch, is about a foot long: the head large and deformed; eyes great; teeth ſmall and numerous. On the head and covers of the gills are ſtrong ſpines. The colour red, with a black ſpot on the covers of the gills, and ſome tranſverſe duſky lines on the ſides. It is a fiſh held in ſome eſteem at the table.

4. The cernua, or ruffe, is found in ſeveral of the Engliſh ſtreams: it is gregarious, aſſembling in large ſhoals, and keeping in the deepeſt part of the water. It is of a much more ſlender form than the perch, and ſeldom exceeds ſix inches in length. The teeth are very ſmall, and diſpoſed in rows. It has only one dorſal fin, extending along the greateſt part of the back: the firſt rays, like thoſe of the perch, are ſtrong, ſharp, and ſpiny; the others ſoft. The body is covered with rough compact ſcales. The back and ſides are of a dirty green, the laſt inclining to yellow, but both ſpotted with black. The dorſal fin is ſpotted with black; the tail marked with tranſverſe bars.

5. The nilotica, or perch of the Nile, is taken about Cairo. The fleſh has a ſweet and exquiſite flavour, and is not hard, but very white. It is one of the beſt fiſhes of the Nile; and as it is of the largeſt ſize in Egypt, it adorns a table if brought upon it entire and well fried.

PERCEPTION, in logic, the firſt and moſt ſimple act of the mind, whereby it perceives, or is conſcious of its ideas. See Logic, Part I. and Metaphysics, nº 36—39. 77.

PERCEPTIVE *faculty of the human mind.*—Concerning this there have been very great controverſies. Every one knows that there are ſenſations ariſing in our minds; but the queſtion is what it is that perceives them, whether it is a man as a compound being of ſoul and body, or whether the living percipient is not a mind, or ſpirit alone, without a body, or elſe a quality only, reſulting from the conſtruction of a body without any diſtinct or ſeparate ſpirit annexed thereto. Theſe are difficulties probably never to be demonſtrated, and we muſt at laſt be content with a probable proof only.

Man is ſo wonderfully made, that he ſeems to aſſign a place to every one of his ſenſations, and yet reaſon and experience tell him, that in truth they cannot exiſt, or be, where he is apt too haſtily to judge, or ſuppoſe them to be; for as nothing can act where it is not, ſo the perceptive power of man cannot poſſibly perceive any thing without or beyond himſelf. It is generally agreed, that the ſecondary qualities of body (as they are called) do not exiſt external to the man, but only the primary ones; though Dr Berkeley attempted to ſhew that they both exiſt together, and that where-ever the colour was, there likewiſe was the extenſion. If this could be ſatisfactorily made to appear, the doctor's ſyſtem would ſtand good for the non-exiſtence of every thing but ſpirit and ideas; but it cannot, and to confine the argument to one ſenſe alone, to wit, ſight; that man perceives colour we are ſure of, and therefore it muſt be within him, or he would act where he was not. Now if he perceived extenſion, that muſt likewiſe be within him too, but then he could perceive no extenſion larger than himſelf:—but as neither extenſion nor colour have any place aſſigned them in the body, ſurely it is not the body, or any conformation thereof, that perceives. We may then ſuppoſe that it is ſomething elſe, which is joined with the body that is the percipient, which let us name *mind* or *ſoul;* this mind ſhould ſeem to be one ſimple uncompounded being, otherwiſe it could not be conſcious that ſucceſſive perceptions were the affections of the ſame thing.

Colour, though haſtily judged to be without the mind, Berkeley and Malbranche have ſufficiently ſhewed not to be ſo; and that extenſion is ſo, ſeems alſo true; becauſe it perceives none of its ſenſations extended, but only aſſigns or fixes a place for them, theſe of colour in particular, external to the man, although in fact they may not be without him; and this place is only determined by an operation of the mind, ſuggeſting or ſuppoſing diſtance, from an experimental obſtruction to the motion of ſome members of the body by which the touch is affected as well as the ſight, and ſo both the tangible and viſible object concluded, though too precipitately, to be in one and the ſame place where the obſtruction is likewiſe judged to be, and hence it obtained the ſuppoſition or ſuggeſtion of diſtance; and as we have no ſenſations to which we do not aſcribe ſome diſtance or place, there muſt be place or ſpace exiſting, or it could not be ſuppoſed. And therefore as nothing is perceived or ſuggeſted but what is ſuppoſed in ſome place, ſo nothing can exiſt but what conſtitutes ſpace, or is in it, and muſt have ſome extenſion.

But then the mind of man ſurely cannot be extended beyond his body, though it often ſuppoſes an extenſion far beyond; and if the extenſion imagined was in the mind, and not a mere operation thereof, by way of ſuppoſition, it could not gueſs ſo much amiſs about the extenſion of objects which has not been familiar to the other organs of ſenſe, as we often find it does; for it ſeems to be a vulgar error to entertain a notion of the mind's judging of any diſtance or magnitudes from any pictures conjectured to be in the fund of the eye, or in itſelf: in the former caſe, if there be any picture in the bottom of the eye, it would judge every object in an inverſe poſition to the body, which is contrary to experience; neither does the mind judge of any magnitude according to any ſuch pictures, but of the real external magnitudes; and ſeldom errs much, unleſs the objects be very remote.—If the bulk of objects were judged of by the pictures in the eye, a flea or mite muſt judge every object very ſmall to what a man does, becauſe the picture will be diminiſhed nearly as the eye is leſs: indeed theſe inſects may ſee diſtinctly ſmaller things than man, becauſe the objects may be brought nearer their ſmall eyes, without throwing the focus of the rays beyond the retina, as the ſame diſtance of object would do in a larger eye, and prevent diſtinct viſion; and it is highly probable, that theſe ſmall inſects cannot ſee objects at a great diſtance, unleſs they are much larger than what a man can ſee at the like diſtance; but then what they do ſee they judge to be of the ſame bigneſs that a man does; and ſo muſt every creature, let its eyes be of what dimenſion or number you pleaſe. It is a vague notion opticians have, who imagine that one, like a microſcope lens, will magnify the picture on the retina, whereas juſt the contrary takes place; for when the eye is uſed alone, without ſuch a lens, the ſhorter focus of the eye forms the picture, and the longer is at the object; but when a lens is uſed by way of a microſcope, the object is in the ſhorter, and the picture at the longer focus, juſt contrary to the method of common viſion.

So, again, if the mind was conſcious of a picture in the eye, it would perceive as many objects the creature had eyes; whereas it judges of no more, let the number of eyes be as they will, than it does by the help of any other of the ſenſes.

From all which we may conclude, that figure, extenſion, and motion, are not perceptible objects; but that ſenſations alone are ſuch, the former being only imagined, by an operation of the mind, to exiſt external to it; and that if they did not ſo exiſt, the mind could not imagine any extenſion, figure, and motion; for there never is found any of them perceivable by it, nor any figure or motion attending a ſimple ſenſation. Indeed it is too commonly thought, that there is a ſhape perceived with colour, or a coloured ſhape; but no object appears of one ſimple colour to a fixed eye, but every part of the object exhibits a different degree of colour; and theſe degrees ſeparate ſenſations, to which the mind aſcribes a place, though, in fact, the colour is not in the place ſo judged of, but ſomething elſe that gives reſiſtance to the actions of the mind on the body; and from hence it ſuppoſes there muſt be ſomething exiſting there which gives riſe to the colour perceived by it.—It is impoſſible the mind ſhould perceive the images of things within itſelf, unleſs it was equally extended with the things themſelves; and if not, how can it be thought that an ideal world can exiſt within the mind, as ſome philoſophers have conjectured? Surely it cannot be; but it muſt be only imagination that directs as to the external exiſtence of real things. We cannot properly be ſaid to imagine what does not or has not really exiſted; for let a blind man try if he can imagine colour, or a deaf man ſound, and he will find himſelf at a loſs. Father Malbranche indeed tells us, that a man may have an idea of a golden mountain that never exiſted; and a man may recollect the figure of a mountain which he has formerly imagined, and remember the colour of gold which he lately had a perception of, and ſuppoſe it poſſible they may be connected, and call this operation of his mind an idea if he pleaſes; but, after all his efforts, if he ſhould happen to think of a mountain as large as Shooter's hill, he will hardly allow it to be contained in his mind.

PERCH, in land-meaſuring, a rod or pole of $16\frac{1}{2}$ foot in length, of which 40 in length and 4 in breadth make an acre of ground. *Cromp. Juriſd.* 222. But, by the cuſtoms of ſeveral counties, there is a difference in this meaſure. In Staffordſhire it is 24 foot; and in the foreſt of Sherwood 25 foot; the foot being there 18 inches long; and in Herefordſhire a perch of ditching is 21 feet, the perch of walling $16\frac{1}{2}$ feet, and a pole of denſhiered ground is 12 feet, &c. *Skene.*

PERCHE, a territory of Orleannois in France, 35 miles long, and 30 broad; bounded on the north by Normandy; on the ſouth, by Maine and Dunois; on the eaſt, by Beauce; and on the weſt, by Maine It takes its name from a foreſt, and is pretty fertile. The inhabitants carry on a pretty good trade; and the principal town is Belleſme.

PERCOLATION, the ſame with FILTRATION. See CHEMISTRY, n° 69.

PERCUSSION, in mechanics, the impreſſion a body makes in falling or ſtriking upon another; or the ſhock of two bodies in motion.

PERDIX. See TETRAO.

PEREASLAW, a ſtrong populous town of Poland, in the palatinate of Kiovia, ſituated on the river Tribecz; in E. Long. 32. 44. N. Lat. 49. 46.

PERENNIALS, or PERENNIAL FLOWERS, in botany, a term applied to thoſe plants whoſe roots will abide many years, whether they retain their leaves in winter or not. Thoſe which retain their leaves are called *evergreens*; but ſuch as caſt their leaves are named *deciduous*, or *perditols*.

PERFECT, ſomething to which nothing is wanting, or that has all the requiſites of its nature and kind.

PERFECT *Cadence*, in MUSIC. See CADENCE.

PERFECT *Tenſe*, in grammar. See PRETERITE.

PERFECTION, the ſtate or quality of a thing PERFECT.

Perfection is divided, according to Chauvinus, into phyſical, moral, and metaphyſical.

Phyſical or natural perfection, is that whereby a thing has all its powers and faculties, and thoſe too in full vigour; and all its parts both principal and ſecondary, and thoſe in their due proportion, conſtitution, &c. in which ſenſe man is ſaid to be perfect when he has a ſound mind in a ſound body. This perfection is by the ſchools frequently termed ενεργητικη, becauſe a thing is enabled thereby to perform all its operations.

Moral perfection is an eminent degree of virtue or moral goodneſs, to which men arrive by repeated acts of piety, beneficence, &c. This is uſually ſubdivided into abſolute or inherent, which is actually in him to whom we attribute it; in imputative, which exiſts in ſome other, and not in him it is attributed to.

Metaphyſical, tranſcendental, or eſſential perfection, is the poſſeſſion of all the eſſential attributes, or of all the parts neceſſary to the integrity of a ſubſtance; or it is that whereby a thing has or is provided of every thing belonging to its nature. This is either abſolute, where all imperfection is excluded, ſuch is the perfection of God; or *ſecundum quid*, and in its kind.

PERFORANS MANUS.
PERFORANS *Pedis*.
PERFORATUS MANUS.
PERFORATUS *Pedis*.
} See ANATOMY, *Table of the Muſcles*.

PERFUME, denotes either the volatile effluvia from any body affecting the organ of ſmelling, or the ſubſtance emitting thoſe effluvia; in which laſt ſenſe the word is moſt commonly uſed. The generality of perfumes are made up of muſk, ambergris, civet, roſe and cedar woods, orange-flowers, jeſſamines, jonquils, tuberoſes, and other odoriferous flowers. Thoſe drugs commonly called aromatics, ſuch as ſtorax, frankincenſe, benzoin, cloves, mace, &c. enter the compoſition of a perfume; ſome are alſo compoſed of aromatic herbs or leaves, as lavender, marjoram, ſage, thyme, hyſſop, &c.

Perfumes were anciently very much in uſe; but, ſince people are become ſenſible of the harm they do to the head, they are generally diſuſed among us; however, they are ſtill common in Spain and Italy.

PERGAMA, (Virgil), the citadel of Troy; which, becauſe of its extraordinary height, gave name to all high buildings, (Servius). Others ſay the walls of Troy were called *Pergama*.

PERGAMUM, (Pliny); called alſo *Pergamea*, (Virgil); *Pergamia*, (Plutarch); a town of Crete, built by Agamemnon in memory of his victory, (Velleius). Here was the burying-place of Lycurgus, (Ariſtoxenus, quoted by Plutarch). It was ſituate near Cydonia, (Servius); to what point not ſaid: but Scylax helps him out, who places the Dactynnean temple of Diana, which ſtood near Cydonia, (Strabo), to the north of the territory of Pergamia.—Another PERGAMUM, (Pliny, Strabo); a town of Myſia, ſituate on the Caicus, which runs by it. It was the royal reſidence of Eumenes, and of the kings of the Attali, (Livy). There an ancient temple of Æſculapius ſtood; an aſylum, (Tacitus). The ornament of Pergamum was the royal library, vying with that of Alexandria in Egypt; the kings of Pergamum and Egypt rivaling each other in this reſpect, (Pliny). Strabo aſcribes this rivalry to Eumenes. Plutarch reckons up 200,000 volumes in the library at Pergamum. Here the *membranæ pergamenæ*, whence the name *parchment*, were invented for the uſe of books, (Varro, quoted by Pliny). The country of Galen, and of Oribaſius chief phyſician to Julian the Apoſtate, (Eunapius), called by ſome the *ape of Galen*. Here P. Scipio died, (Cicero). Attalus ſon of Eumenes dying without iſſue, bequeathed his kingdom to the Roman people, who reduced it to a province, (Strabo). *Pergameus*, the epithet, (Martial). Here was one of the nine *conventus juridici*, or aſſemblies of the *Aſia Romana*, called *Pergamenus*, and the ninth in order, (Pliny); which he alſo calls *juriſdictio Pergamena*.

PERGAMUS, an ancient kingdom of Aſia, formed out of the ruins of the empire of Alexander the Great It commenced about the year 283. The firſt ſovereign was one Philetærus, an eunuch, by birth a Paphlagonian, of a mean deſcent, and in his youth a menial ſervant to Antigonus one of Alexander's captains. He afterwards ſerved Lyſimachus king of Macedon and Thrace, who appointed him keeper of his treaſures lodged in Pergamus. While he held this employment, having fallen under the diſpleaſure of Arſinoe wife to Lyſimachus, ſhe found means to make a quarrel between him and his maſter; upon which Philetærus ſeized on the caſtle of Pergamus, together with the treaſures entruſted to his care, amounting to 90,000 talents. At firſt he offered his ſervice, together with his treaſure, to Seleucus king of Syria: but both Seleucus and Lyſimachus dying ſoon after, he kept poſſeſſion of the town and treaſure alſo till his death; which happened 20 years after his revolt from Lyſimachus.

Philetærus left the city of Pergamus to his brother, or, according to ſome, to his brother's ſon Eumenes I.; and he, laying hold of the opportunity offered by the diſſenſions among the Seleucidæ, poſſeſſed himſelf of many ſtrong-holds in the province of Aſia; and having hired a body of Galatians, defeated Antiochus, as he was returning from a victory gained over his brother Seleucus Callinicus. By this victory he obtained poſſeſſion of the greater part of Aſia: however, he did not long enjoy his acquiſitions; for he died next year of immoderate drinking, a vice to which he was greatly addicted.

Eumenes was ſucceeded by Attalus I. nephew of Philetærus, and the firſt who took upon him the title of king of Pergamus. He defeated the Gauls, who were deſirous of ſettling in his territory; and, according to Livy, was the firſt of the Aſiatic princes who refuſed to pay a contribution to theſe barbarians. When Seleucus Ceraunus was engaged in other wars, he invaded his territories, and conquered all the provinces on this ſide of Mount Taurus; but was ſoon driven out of his new acquiſitions by Seleucus and his grandfather Achæus, who entering into an alliance againſt him, deprived him of all his newly acquired territories, and even beſieged him in his capital. Upon this Attalus invited to his aſſiſtance the Gauls who had ſettled in Thrace; and with their help not only obliged the enemy to raiſe the ſiege of Pergamus, but quickly recovered all the provinces he had loſt. After this he invaded Ionia and the neighbouring provinces, where ſeveral cities voluntarily ſubmitted to him. The Teians, Colophonians, with the inhabitants of Egea and Lemnos, ſent deputies declaring themſelves ready to acknowledge him for their ſovereign; the Carſenes, on the other ſide the river Lycus, opened their gates to him, having firſt expelled the governor ſet over them by Achæus. From thence he advanced to Apia, and encamping on the banks of the river Megithus, received homage from the neighbouring nations. But here the Gauls, being frightened by an eclipſe of the moon, refuſed to proceed farther; which obliged Attalus to return to the Helleſpont, where he allowed his allies to ſettle, giving them a large and fruitful territory, and promiſing that he would always aſſiſt and protect them to the utmoſt of his power.

Attalus having thus ſettled his affairs with equal honour and advantage to himſelf, entered into an alliance with Rome, and afterwards joined them in their war againſt Philip king of Macedon. Here he had the command of the Rhodian fleet; with which he not only drove the Macedonians quite out of the ſeas, but having landed his men, he, in conjunction with the Athenians, invaded Macedon, and obliged Philip to raiſe the ſiege of Athens, which he had greatly diſtreſſed; for which ſervices the Athenians not only heaped on him all the favours they could, but called one of their tribes by his name; an honour they had never beſtowed on any foreigner before.

Attalus, not contented with all he had yet done againſt Philip, attempted to form a general confederacy of the Greeks againſt him. But while he was haranguing the Bœotians to this purpoſe, and exhorting them with great vehemence to enter into an alliance with the Romans againſt their common enemy, he fell down ſpeechleſs. However, he came to himſelf again, and deſired to be carried by ſea from Thebes to Pergamus, where he died ſoon after his arrival, in the 72d year of his age and 43d of his reign.

This prince was a man of great generoſity, and ſuch an enthuſiaſt in learning and learned men, that he cauſed a grammarian, named *Daphidas*, to be thrown into the ſea from the top of a high rock, becauſe he ſpoke diſreſpectfully of Homer.

Attalus was ſucceeded by his eldeſt ſon Eumenes II. He was exceedingly attached to the Romans, inſomuch that he refuſed the daughter of Antiochus the Great in marriage, leſt he ſhould thus have been led into a difference with that people. He alſo gave notice to the Roman ſenate of the tranſactions of Ariarathes king of Cappadocia, who was making great preparations both by ſea and land. Nor did Eumenes ſtop here; for when he ſaw the war about to break out between Antiochus and the Romans, he ſent his brother Attalus to Rome to give information of the proceedings of Antiochus. The ſenate heaped honours both on Eumenes and his brother; and in the war which followed, gave the command of their fleet to the king of Pergamus in conjunction with C. Livius Salinator. The victory gained on this occaſion was in a great meaſure owing to Eumenes, who boarded ſome of the enemy's

Pergamus.

ſhips in perſon, and during the whole action behaved with uncommon bravery. Some time afterwards Eumenes, entering the territories of Antiochus with a body of 5000 men, ravaged all the country about Thyatira, and returned with an immenſe booty. But in the mean time Antiochus invading Pergamus in his turn, ravaged the whole country, and even laid ſiege to the capital. Attalus, the king's brother held out with an handful of men till the Achæans, who were in alliance with Eumenes, ſent 1000 foot and 100 horſe to his aſſiſtance. As this ſmall body of auxiliaries were all choſen men, and commanded by an experienced officer, they behaved with ſuch bravery that the Syrians were obliged to raiſe the ſiege. At the battle of Magneſia, too, Eumenes behaved with the greateſt bravery; not only ſuſtaining the firſt attack of the enemy's elephants, but driving them back again on their own troops, which put the ranks in diſorder, and gave the Romans an opportunity of giving them a total defeat by attacking them opportunely with their horſe. In conſequence of this defeat, Antiochus was obliged to conclude a peace with the Romans on ſuch terms as they pleaſed to preſcribe; one of which was, that he ſhould pay Eumenes 400 talents, and a quantity of corn, in recompence for the damage he had done him.

Eumenes now thought of obtaining ſome reward from the Romans equivalent to the ſervices he had done them. Having gone to Rome, he told the ſenate, that he was come to beg of them that the Greek cities which had belonged to Antiochus before the commencement of the late war, might now be added to his dominions; but his demand was warmly oppoſed by the ambaſſadors from Rhodes, as well as by deputies from all the Greek cities in Aſia. The ſenate, however, after hearing both parties, decided the matter in favour of Eumenes, adding to his dominions all the countries on this ſide of Mount Taurus which belonged to Antiochus; the other provinces lying between that mountain and the river Mæander, excepting Lycia and Caria, were beſtowed on the Rhodians. All the cities, which had paid tribute to Attalus, were ordered to pay the ſame to Eumenes; but ſuch as had been tributary to Antiochus were declared free.

Soon after this Eumenes was engaged in a war with Pruſias king of Bithynia, who made war upon him by the advice of Hannibal the celebrated Carthaginian general. But Eumenes, being aſſiſted by the Romans, defeated Pruſias in an engagement by ſea, and another by land; which ſo diſheartened him, that he was ready to accept of peace on any terms. However, before the treaty was concluded, Hannibal found means to draw Philip of Macedon into the confederacy, who ſent Philocles, an old and experienced officer, with a conſiderable body of troops to join Pruſias. Hereupon Eumenes ſent his brother Attalus to Rome with a golden crown, worth 15,000 talents, to complain of Pruſias for making war on the allies of the Roman people without any provocation. The ſenate accepted the preſent, and promiſed to adjuſt every thing to the ſatisfaction of their friend Eumenes, whom they looked upon to be the moſt ſteady ally they had in Aſia. But in the mean time Pruſias, having ventured another ſea-fight, by a contrivance of Hannibal's, gained a complete victory. The Carthaginian commander adviſed him to fill a great many earthen veſſels with various kinds of ſerpents and other poiſonous reptiles, and in the heat of the fight to throw them into the enemies ſhips ſo as to break the pots and let the ſerpents looſe. All the ſoldiers and ſeamen were commanded to attack the ſhip in which Eumenes was, and only to defend themſelves as well as they could againſt the reſt; and that they might be in no danger of miſtaking the ſhip, an herald was ſent before the engagement with a letter to the king. As ſoon as the two fleets drew near, all the ſhips of Pruſias, ſingling out that of Eumenes, diſcharged ſuch a quantity of ſerpents into it, that neither ſoldiers nor ſailors could do their duty, but were forced to fly to the ſhore, leſt they ſhould fall into the enemy's hands. The other ſhips, after a faint reſiſtance, followed the king's example, and were all driven aſhore with great ſlaughter; the ſoldiers being no leſs annoyed by the ſtings of the ſerpents, than by the weapons of the enemy. The greateſt part of the ſhips of Eumenes were burnt, ſeveral taken, and the others ſo much ſhattered, that they became quite unſerviceable. The ſame year Pruſias gained two remarkable victories over Eumenes by land, both of which were entirely owing to ſtratagems of Hannibal. But, while matters were thus going on to the diſadvantage of Eumenes, the Romans interfered, and by their deputies not only put an end to the differences between the two kings, but prevailed on Pruſias to betray Hannibal; upon which he poiſoned himſelf, as hath been related under the article HANNIBAL.

Eumenes, being thus freed from ſuch a dangerous enemy, engaged in a new war with the kings of Cappadocia and Pontus, in which alſo he proved victorious. His friendſhip for the Romans he carried to ſuch a degree of enthuſiaſm, that he went in perſon to Rome to inform them of the machinations of Perſes king of Macedon. He had before quarrelled with the Rhodians, who ſent ambaſſadors to Rome to complain of him. But as the ambaſſadors happened to arrive while the king himſelf was preſent in the city, the Rhodian ambaſſadors could not obtain any hearing, and Eumenes was diſmiſſed with new marks of favour. This journey, however, had almoſt proved fatal to him; for, on his return, as he was going to perform a ſacrifice at Delphi, two aſſaſſins, ſent by Perſes, rolled down two great ſtones upon him as he entered the ſtraits of the mountains. With one he was dangerouſly wounded on the head, and with the other on the ſhoulder. He fell with the blows from a ſteep place, and thus received many other bruiſes; ſo that he was carried on board his ſhip when it could not well be known whether he was dead or alive. His people, however, ſoon finding that he was ſtill alive, conveyed him to Corinth, and from Corinth to Ægina, having cauſed their veſſels to be carried over the Iſthmus.

Eumenes remained at Ægina till his wounds were cured, which was done with ſuch ſecrecy, that a report of his death was ſpread all over Aſia, and even believed at Rome; nay, his brother Attalus was ſo convinced of the truth of this report, that he not only aſſumed the government, but even married Stratonice the wife of Eumenes. But in a ſhort time Eumenes convinced them both of his being alive, by returning to his kingdom. On the receipt of this news Attalus reſigned the ſovereignty in great haſte, and went to meet his brother; carring an halberd, as one of his guards. Eumenes received both him and the queen with great tenderneſs, nor did he ever ſay any thing which might tend to make them uneaſy; only it is ſaid he whiſpered in his brother's ear when he firſt ſaw him, “Be in no haſte to marry my wife again till you are ſure that I am dead.”

The king being now more than ever exaſperated againſt Perſes, joined the Romans in their war againſt Perſes; but during the courſe of it he ſuddenly cooled in his affection towards thoſe allies whom he had hitherto ſerved with ſo much zeal, and that to ſuch a degree, that he admitted ambaſſadors from Perſes, and offered to ſtand neuter if he would pay him 1000 talents, and for 1500, to influence the Romans to grant him a ſafe and honourable peace. But theſe negociations were broke off without effect, by reaſon of the diſtruſt which the two kings had of one another. Eumenes could not truſt Perſes unleſs he paid him the money beforehand; while, on the other hand, Perſes did not care to part with the money before Eumenes had performed what he promiſed; neither could he be induced to pay the ſum in queſtion, though the king of Pergamus offered to give hoſtages for the performance of his promiſe. What the reaſon of ſuch a ſudden change in the diſpoſition of Eumenes was, is nowhere told; however, the fact is certain. The negociations abovementioned were concealed from the Romans as long as poſſible; however, they ſoon came to be known, after which the republic began to entertain no ſmall jealouſy of their old friend, and therefore heaped favours on his brother Attalus, without taking any notice of the king himſelf. Eumenes had ſent him to Rome to congratulate the ſenate on the happy iſſue of the war with Perſes, not thinking that his practices had been diſcovered. However, the ſenate, without taking any notice of their diſaffection to Eumenes at firſt, entertained Attalus with the greateſt magnificence; then ſeveral of the ſenators who viſited him proceeded to acquaint him with their ſuſpicions of the king, and deſired Attalus to treat with them in his own name, aſſuring him, that the kingdom of Pergamus would be granted him, if he demanded it, by the ſenate. Theſe ſpeeches had at firſt ſome effect; but Attalus, being of an honeſt diſpoſition, and aſſiſted by the advice of a phyſician called *Stratius*, a man of great probity, reſolved not to comply with their deſire. When he was admitted to the ſenate, therefore, he firſt congratulated them on the happy iſſue of the Macedonian war, then modeſtly recounted his own ſervices; and laſtly, acquainted them with the motive of his journey; intreating them to ſend ambaſſadors to the Gauls, who by their authority might ſecure his brother from any danger of their hoſtilities; and he requeſted them alſo, that the two cities of Ænus and Maronea might be beſtowed on himſelf. The ſenate, imagining that Attalus deſigned to chooſe ſome other day to ſue for his brother's kingdom, not only granted all his requeſts, but ſent him richer and more magnificent preſents than they had ever done before. Upon this Attalus immediately ſet out on his return to Pergamus; which ſo provoked the ſenators, that they declared the cities free which they had promiſed to Attalus; thus rendering ineffectual their promiſe which they were aſhamed openly to revoke; and as for the Gauls, who were on all occaſions ready to invade the kingdom of Pergamus, they ſent ambaſſadors to them, with inſtructions to behave in ſuch a manner as would rather tend to encourage them in their deſign than diſſuade them from it.

Eumenes, being alarmed at thoſe proceedings, reſolved to go in perſon to Rome, in order to juſtify himſelf. But the ſenate, having already condemned him in their own minds, reſolved not to hear his vindication. For this reaſon, as ſoon as they heard of his deſign, they made an act that no king ſhould be permitted to enter the gates of Rome. Eumenes, however, who knew nothing of this act, ſet forward on his journey, and landed at Brunduſium; but, no ſooner did the Roman ſenate get intelligence of his arrival there, than they ſent a quæſtor acquainting him with the decree of the ſenate; and telling him at the ſame time, that if he had any buſineſs to tranſact with the ſenate, he was appointed to hear it and tranſmit it to them; but if not, that the king muſt leave Italy without delay. To this Eumenes replied, that he had no buſineſs of any conſequence to tranſact, and that he did not ſtand in need of any of their aſſiſtance; and without ſaying a word more, went on board his ſhip, and returned to Pergamus.

On his return home, the Gauls, being encouraged by the cold reception which he had met with at Rome, invaded his territories, but were repulſed with great loſs by the king, who afterwards invaded the dominions of Pruſias, and poſſeſſed himſelf of ſeveral cities. This produced new complaints at Rome; and Eumenes was accuſed, not only by the ambaſſadors of Pruſias, but alſo by thoſe of the Gauls and many cities in Aſia, of keeping a ſecret correſpondence with Perſes king of Macedon. This laſt charge was confirmed by ſome letters which the Romans themſelves had intercepted; ſo that Eumenes found it impoſſible to keep up his credit any longer at Rome, though he ſent his brothers Athenæus and Attalus thither to intercede for him. The ſenators, in ſhort, had conceived the moſt implacable hatred againſt him, and ſeemed abſolutely bent on his deſtruction, when he died, in the 39th year of his reign, leaving his kingdom and his wife to his brother Attalus. He left one ſon, but he was an infant, and incapable of governing the kingdom; for which reaſon Eumenes choſe rather to give the preſent poſſeſſion of the crown to his brother, reſerving the ſucceſſion to his ſon, than to endanger the whole by committing the management of affairs to his ſon's tutors.

Attalus, in the beginning of his reign, found himſelf greatly diſtreſſed by Pruſias king of Bithynia, who not only overthrew him in a pitched battle, but advanced to the very walls of Pergamus, ravaging the country as he marched along; and at laſt reduced the royal city itſelf. The king, however, ſaved himſelf by a timely flight, and diſpatched ambaſſadors to Rome, complaining of the bad uſage of Pruſias. The latter endeavoured to defend himſelf, and to throw the blame on Attalus. But, after a proper inquiry was made into the matter, Pruſias was found to be entirely in the wrong; in conſequence of which, he was at laſt obliged to conclude a peace with his adverſary on the following terms. 1. That he ſhould immediately deliver up to Attalus 20 ſhips with decks. 2. That he ſhould pay 500 talents to Attalus within the ſpace of 20 years. 3. That he ſhould pay 100 talents to ſome of the other Aſiatic nations by way of reparation for the damages they had ſuſtained from him. And, 4. Both parties ſhould be content with what they had before the beginning of the war.

Some time after this, Pruſias having made an unnatural attempt on the life of his ſon Nicomedes, the latter rebelled, and, with the aſſiſtance of Attalus, drove his father from the throne, and, as is ſaid, even murdered him in the temple of Jupiter. The Romans took no notice of theſe tranſactions, but ſhewed the ſame kindneſs to Attalus as formerly. The laſt enterpriſe in which we find Attalus engaged, was againſt Andriſeus the pretended ſon of Perſes king of Macedon, where he aſſiſted the Romans; after which he gave himſelf up entirely to eaſe and luxury, committing ſtate affairs entirely to his miniſters; and thus continued to his death, which happened in the 82d year of his age, about 138 B. C.

Attalus II. was ſucceeded by Attalus III. the ſon of Eumenes; for the late king, conſidering that he only held the crown as a truſt for his nephew, paſſed by his own children in order to give to it him, tho' he appears to have been by no means worthy of it. He is ſaid to have been deprived of his ſenſes thro' the violence of his grief for his mother's death; and indeed, throughout his whole reign, he behaved more like a madman than any thing elſe. Many of his ſubjects of the higheſt quality were cut off with their wives and children, upon the moſt groundleſs ſuſpicions; and for theſe executions he made uſe of mercenaries hired out from among the moſt barbarous nations. Thus he proceeded till he had cut off all the beſt men in the kingdom; after which he fell into a deep melancholy, imagining that the ghoſts of thoſe whom he had murdered were perpetually haunting him. On this he ſhut himſelf up in his palace, put on a mean apparel, let his hair and beard grow, and ſequeſtered himſelf from all mankind. At laſt he withdrew from the palace, and retired into a garden, which he cultivated with his own hands, and filled with all ſorts of poiſonous herbs. Theſe he uſed to mix with wholeſome pulſe, and ſend packets of them to ſuch as he ſuſpected. At laſt, being weary of this amuſement, and living in ſolitude, becauſe nobody durſt approach him, he took it in his head to follow the trade of a founder, and make a brazen monument. But, while he laboured at melting and caſting the braſs, the heat of the ſun and furnace threw him into a fever, which in ſeven days put an end to his tyranny, after he had ſat on the throne five years.

On the death of the king, a will was found, by which he left the Roman people heirs of all his goods; upon which they ſeized on the kingdom, and reduced it to a province of their empire by the name of *Aſia Proper*. But Ariſtonicus, a ſon of Eumenes by an Epheſian courteſan, reckoning himſelf the lawful heir to the crown, could by no means be ſatisfied with this uſurpation of the Romans, and therefore aſſembled a conſiderable army to maintain his pretenſions. The people in general, having been accuſtomed to a monarchy, dreaded a republican form of government; in conſequence of which, they aſſiſted Ariſtonicus, and ſoon put him in a condition to reduce the whole kingdom. The news, however, were ſoon carried to Rome, and Licinius Craſſus, the pontifex maximus, was ſent into the eaſt, with orders to inforce obedience to the king's will. Hiſtorians take no notice of any forces which were ſent along with this commander; whence it is ſuppoſed, that he depended on aſſiſtance from the Aſiatics, who were in alliance with Rome, or from the Egyptians. But when he came thither, he found both the Syrians and Egyptians ſo reduced, that he could not expect any aſſiſtance from them. However, he was ſoon ſupplied with troops in plenty by the kings of Pontus, Bithynia, Cappadocia, and Papplagenia; but managed matters ſo ill, that he was entirely defeated and taken priſoner. Thoſe who took him deſigned to carry him to Ariſtonicus; but he, not able to endure the diſgrace, would have laid violent hands on himſelf if he had not been diſarmed. However, being allowed to keep a rod for managing the horſe on which he ſat, he ſtruck a Thracian ſoldier who ſtood near him ſo violently with it, that he beat out one of his eyes; upon which the other drew his ſword, and run him thro' on the ſpot. His head was brought to Ariſtonicus, who expoſed it to public view; but the body was honourably buried.

Ariſtonicus had no great time to enjoy the fruits of his victory. Indeed he behaved very improperly after it; for, inſtead of preparing to oppoſe the next army, which he might have been aſſured the Romans would ſend againſt him, he ſpent his time in feaſting and revelling. But he was ſoon rouſed out of his lethargy by Perpenna the new conſul, who having aſſembled with incredible expedition the troops of the allies, came unexpectedly upon him, obliged him to venture an engagement at a diſadvantage, and entirely defeated him. Ariſtonicus fled to a city called *Stratonice;* but was ſo cloſely purſued by the conqueror, that the garriſon, having no method of ſupplying themſelves with proviſions, delivered up their leader, as well as a philoſopher named *Bloſius*, who had been the companion and counſellor of Ariſtonicus. The philoſopher behaved with great reſolution after being taken, and openly defended his ſiding with Ariſtonicus, becauſe he thought his cauſe juſt. He exhorted the latter to prevent the diſgrace and miſery of captivity by a voluntary death; but Ariſtonicus, looking upon death as a greater miſery than any captivity, ſuffered himſelf to be treated as his conquerors pleaſed.

In the mean time, a new conſul, named *Manius Aquilius*, being arrived from Rome, ſent a moſt haughty meſſage to Perpenna, requiring him immediately to deliver up Ariſtonicus as a captive belonging to his triumph when the war ſhould be ended. With this demand Perpenna refuſed to comply, and his refuſal had almoſt produced a civil war. However, this was prevented by the death of Perpenna, which happened ſoon after the diſpute commenced. The Pergamenians, notwithſtanding the defeat and captivity of their leader, ſtill held out with ſuch obſtinacy, that Aquilius was obliged to beſiege, and take by force almoſt every city in the kingdom. In doing this, he took a very effectual, though exceeding cruel method. Moſt of the cities in the kingdom had no other water than what was brought from a conſiderable diſtance in aqueducts. Theſe Aquilius did not demoliſh, but poiſoned the water, which produced the greateſt abhorrence of him throughout all the eaſt. At laſt, however, the whole country being reduced, Aquilius triumphed, the unhappy Ariſtonicus was led in chains before his chariot, and probably ended his miſerable life in a dungeon. The country remained ſubject to the Romans while their empire laſted, but is now in the hands of the Turks. The city is half ruined, and is known by the name of *Pergamus*. It is inhabited by about 3000 Turks, and a few families of poor Chriſtians. E. Long. 27. 27. N. Lat. 30. 3.

PERIANDER, tyrant of Corinth and Corcyra, was reckoned among the ſeven wiſe men of Greece; though he might rather have been reckoned among the moſt wicked men, ſince he changed the government of his country, deprived his countrymen of their liberty, uſurped the ſovereignty, and committed the moſt ſhocking crimes. In the beginning of his reign he behaved with mildneſs; but after his having ſent to the tyrant of Syracuſe to conſult him on the ſafeſt method of government, he abandoned himſelf to cruelty. The latter, having heard Periander's envoys, took them into a field, and, inſtead of anſwering them, pulled up before them the ears of corn which exceeded the reſt in height. Periander, on being told of this action, underſtood what was meant by it. He firſt ſecured himſelf by a good guard, and then put the moſt powerful Corinthians to death. He abandoned himſelf to the moſt enormous crimes; committed inceſt with his mother, kicked to death his wife Meliſſa, daughter of Procles king of Epidaurus, notwithſtanding her being with child; and was ſo enraged at Lycophron, his ſecond ſon, for lamenting his mother's death, that he baniſhed him into the iſland of Corcyra. Yet he paſſed for one of the greateſt politicians of his time; and Heraclides tells us, that he forbad voluptuouſneſs; that he impoſed no taxes, contenting himſelf with the cuſtom ariſing from the ſale and the import and export of commodities; that, tho' wicked himſelf, he hated the wicked, and cauſed all pimps to be drowned; laſtly, that he eſtabliſhed a ſenate, and ſettled the expence of its members. He died 585 B. C.

PERIAGOGE, in rhetoric, is uſed where many things are accumulated into one period which might have been divided into ſeveral.

PERIANTHIUM, (from περι, "round," and ανθος, "the flower,") the flower-cup properly ſo called, the moſt common ſpecies of calix, placed immediately under the flower, which is contained in it as in a cup. See BOTANY, p. 1296.

PERICARDIUM, in anatomy, a membranous bag filled with water, which contains the heart in man and many other animals. It is formed by a duplicature of the mediaſtinum, or membrane which divides the thorax into two unequal parts. See ANATOMY, n° 382, 305, 386.

PERICARPIUM, (from περι, "round," and καρπος, "fruit,") the ſeed-veſſel; an entrail of the plant big with ſeeds, which it diſcharges when ripe. The ſeed veſſel is in fact the developed ſeed-bud, and may very properly be compared to the fecundated ovary in animals; for it does not exiſt till after the fertilizing of the ſeeds by the male-duſt, and the conſequent fall of the flower. All plants, however, are not furniſhed with a ſeed-veſſel; in ſuch as are deprived of it, the receptacle or calix performs its functions by incloſing the ſeeds, as in a matrix, and accompanying them to perfect maturity.

PERICHORUS, in antiquity, a name given by the Greeks to their profane games or combats, that is, to ſuch as were not conſecrated to any of the gods.

PERICLES, was one of the greateſt men that ever flouriſhed in Greece. He was educated with all imaginable care; and beſide other maſters, he had for his tutors Zeno, Eleates, and Anaxagoras. He learned from the laſt of theſe to fear the gods without ſuperſtition, and to account for an eclipſe from a natural cauſe. Many were unjuſt enough to ſuſpect him of atheiſm, becauſe he had perfectly ſtudied the doctrine of that philoſopher. He was a man of undoubted courage; and of ſuch extraordinary eloquence, ſupported and improved by knowledge, that he gained almoſt as great an authority under a republican government as if he had been a monarch; but yet he could not eſcape the ſatirical ſtrokes of the comic poets. His diſſoluteneſs with the women was one of the vices with which he was chiefly charged. He died the third year of the Peloponneſian war, after long ſickneſs, which had weakened his underſtanding. Aſpaſia, Pericles's favourite, was a learned woman of Miletus: ſhe taught Socrates rhetoric and politics. As Pericles cared not much for his wife, he willingly gave her up to another, and married Aſpaſia, whom he paſſionately loved.

PERICRANIUM, in anatomy, a thick ſolid coat or membrane, covering the outſide of the cranium or ſkull. See ANATOMY, n° 4.

PERIGEE, in aſtronomy, that point of the ſun or moon's orbit wherein they are at the leaſt diſtance from the earth, in which ſenſe it ſtands oppoſed to apogee.

PERIGRAPHE, a word uſually underſtood to expreſs a careleſs or inaccurate delineation of any thing; but in Veſalius it is uſed to expreſs the white lines or impreſſions that appear on the muſculus rectus of the abdomen.

PERIGEUX, an ancient epiſcopal town of France, capital of the province of Perigord, ſeated on the river Iſle, in E. Long. 0. 33. N. Lat. 45. 18. It is remarkable for the ruins of the temple of Venus, and an amphitheatre.

PERIGORD, a province of France, which makes part of Guienne, bounded on the north by Angoumois, and a part of Marche, and on the eaſt by Quercy and Limoſin; on the ſouth, by Agenois and Bazadois; and on the weſt, by Bourledois, Angoumois, and a part of Saintonge. It is about 83 miles in length, and 60 in breadth. It abounds in iron mines, and the air is pure and healthy. Perigeux is the capital town.

PERIHELIUM, in aſtronomy, that part of a planet or comet's orbit wherein it is in its leaſt diſtance from the ſun, in which ſenſe it ſtands in oppoſition to aphelium.

PERIMETER, in geometry, the bounds or limits of any figure or body. The perimeters of ſurfaces or figures are lines; thoſe of bodies are ſurfaces. In circular

cular figures, inſtead of perimeter, we ſay circumference, or periphery.

PERINÆUM, or Perineum, in anatomy, the ſpace between the anus and the parts of generation, divided into two equal lateral diviſions by a very diſtinct line, which is longer in males than in females.

PERINKSKIOLD (John), a learned Swediſh writer, born at Stregneſia in Sudermania, in 1954, ſtudied under his father, who was profeſſor of eloquence and poetry, and afterwards became well ſkilled in the antiquities of the North. He was made profeſſor at Upſal, ſecretary antiquary of the king of Sweden, and counſellor of the chancery of antiquities. He died in 1720. His principal works are: 1. A hiſtory of the kings of Norway. 2. A hiſtory of the kings of the North. 3. An edition of John Meſſenius on the kings of Sweden, Denmark, and Norway, in 14 vols folio, &c. All Peringſkiold's works are excellent, and highly eſteemed.

PERIOD, in aſtronomy, the time taken up by a ſtar or planet in making a revolution round the ſun; or the duration of its courſe till it return to the ſame part of its orbit.

The periodical times of the planets round the ſun are as follow:

The period of	ſeconds.	min.	hrs.	days.
Mercury - -	87	23	15	53
Venus - -	224	16	49	24
The earth - -	365	6	9	14
Mars - - -	686	23	27	30
Jupiter - -	4332	12	20	25
Saturn - -	10759	6	36	26

There is a wonderful harmony between the diſtances of the planets from the ſun, and their periods round him; the great law whereof is, that the ſquares of the periodical times of the primary planet, are to each other as the cubes of their diſtances from the ſun: and likewiſe, the ſquares of the periodical times of the ſecondaries of any planet are to each other as the cubes of their diſtances from that primary. This harmony among the planets is one of the greateſt confirmations of the Copernican hypotheſis. See Astronomy, n° 132.

For the periods of the moon, ſee Astronomy, n° 223.

The periods of ſeveral comets are now pretty well aſcertained. See Astronomy, n° 46 *et ſeq.*

Period, in chronology, denotes a revolution of a certain number of years, or a ſeries of years, whereby, in different nations, and on different occaſions, time is meaſured; ſuch are the following.

Calippic Period, a ſyſtem of ſeventy-ſix years. See Calippic.

Dionyſian Period, or *Victorian Period*, a ſyſtem of 532 lunæ-ſolar and Julian years; which being elapſed, the characters of the moon fall again upon the ſame day and feria, and revolve in the ſame order, according to the opinion of the ancients.

This period is otherwiſe called the *great paſchal cycle*, becauſe the Chriſtian church firſt uſed it to find the true time of the paſcha or eaſter. The ſum of theſe years ariſe by multiplying together the cycles of the ſun and moon. See Astronomy, n° 308.

Hipparchus's Period, a ſyſtem of 304 years, both lunar and ſolar; which being elapſed, Hipparchus thought that the reckoning by the lunar motion would coincide again with the ſolar meaſures. This period comprehends 3760 lunar months, or 111,039 days; the ſum of which ariſes from the multiplication of the Calippic period by 4, ſubtracting unity from the product.

Julian Period. See Julian.

Period, in grammar, denotes a ſmall compaſs of diſcourſe, containing a perfect ſentence, and diſtinguiſhed at the end by a point, or full ſtop, thus (.); and in members or diviſions marked by commas, colons, &c.

Period, in oratory, See there, n° 44.

PERIODIC, or Periodical, ſomething that terminates and comprehends a period; ſuch is a periodic month; being the ſpace of time wherein the moon diſpatches her period.

PERIOECI, περιοικι, in geography, ſuch inhabitants of the earth as have the ſame latitudes, but oppoſite longitudes, or live under the ſame parallel and the ſame meridian, but in different ſemicircles of that meridian, or in oppoſite points of the parallel. Theſe have the ſame common ſeaſons throughout the year, and the ſame phenomena of the heavenly bodies; but when it is noonday with the one it is midnight with the other, there being twelve hours in an eaſt and weſt direction. Theſe are found on the globe by the hour-index, or by turning the globe half round, that is, 180 degrees either way.

PERIOSTEUM, or Periostium, in anatomy, a nervous vaſcular membrane, endued with a very quick ſenſe, immediately ſurrounding, in every part, both the internal and external ſurfaces of all the bones in the body, excepting only ſo much of the teeth as ſtand above the gums, and the peculiar places on the bones, in which the muſcles are inſerted. It is hence divided into the external and internal perioſteum; and where it externally ſurrounds the bones of the ſkull, it is generally called the *pericranium*. See Anatomy, n° 4.

PERIPATETIC philosophy, that ſyſtem taught and eſtabliſhed by Ariſtotle, and maintained by his followers the Peripatetics, called alſo the *Ariſtotelians*. See the next article.

PERIPATUS, (anc. geog.) the place where Ariſtotle taught; a part of the Lyceum, a gymnaſium at Athens, ſituate on the banks of the Iliſſus. The reaſon of the appellation is, that Ariſtotle walked as he taught, (Cicero, Diogenes Laertius). *Peripatetici* the name of the ſect or followers of Ariſtotle.

PERIPETIA, in the drama, that part of a tragedy wherein the action is turned, the plot unravelled, and the whole concludes. See Catastrophe.

PERIPHERY, in geometry, the circumference of a circle, ellipſis, or any other regular curvilinear figure.

PERIPLOCA, Virginian ſilk, a genus of the digynia order, belonging to the pentandria claſs of plants. There are four ſpecies, all of them natives of warm climates. They are perennial ſhrubby plants with turning branches, riſing from three to 40 feet high, adorned with white and purple flowers. The ſeeds are incloſed in capſules filled with a ſoft down. Two of the ſpecies, viz. the Græca and Africana, will live in the open air in this country, and are propagated by layers; but the others are tender, ſo require to be kept in a ſtove.

PERISCII, in geography, the inhabitants of either frigid zone, between the polar circles and the poles, where the ſun, when in the ſummer ſigns, moves only round about them, without ſetting; and conſequently their ſhadows in the ſame day turn to all the points of the horizon.

PERISTALTIC, a vermicular ſpontaneous motion of the inteſtines, performed by the contraction of the circular and longitudinal fibres of which the fleſhy coats of the inteſtines are compoſed; by means whereof the chyle is driven into the orifices of the lacteal veins, and the fæces are protruded towards the anus.

PERISTYLE, in ancient architecture, a building encompaſſed with a row of columns on the inſide.

PERITONÆUM, in anatomy, is a thin, ſmooth, and lubricous membrane, inveſting the whole internal ſurface of the abdomen, and containing moſt of the viſcera of that part as it were in a bag. See ANATOMY, n° 350.

PERITROCHIUM, in mechanics, denotes a wheel, or circle, concentric with the baſe of a cylinder, and moveable together with it about its axis. See MECHANICS.

PERJURY, in law, is defined by Sir Edward Coke to be a crime committed when a lawful oath is adminiſtered, in ſome judicial proceeding, to a perſon who ſwears wilfully, abſolutely, and falſely, in a matter material to the iſſue or point in queſtion. The law takes no notice of any perjury but ſuch as is committed in ſome court of juſtice having power to adminiſter an oath; or before ſome magiſtrate or proper officer inveſted with a ſimilar authority, in ſome proceedings relative to a civil ſuit or a criminal proſecution: for it eſteems all other oaths unneceſſary at leaſt, and therefore will not puniſh the breach of them. For which reaſon it is much to be queſtioned, how far any magiſtrate is juſtifiable in taking a voluntary affidavit in any extrajudicial matter, as is now too frequent upon every petty occaſion; ſince it is more than poſſible that, by ſuch idle oaths, a man may frequently, *in foro conſcientiæ*, incur the guilt, and at the ſame time evade the temporal penalties of perjury. The perjury muſt alſo be corrupt, (that is, committed *malo animo*), wilful, poſitive, and abſolute; not upon ſurpriſe, or the like: it alſo muſt be in ſome point material to the queſtion in diſpute; for if it only be in ſome trifling collateral circumſtance, to which no regard is paid, it is no more penal than in the voluntary extrajudicial oaths before-mentioned. Subornation of perjury is the offence of procuring another to take ſuch a falſe oath, as conſtitutes perjury in the principal. The puniſhment of perjury and ſubornation, at common law, has been various. It was anciently death; afterwards baniſhment, or cutting out the tongue; then forfeiture of goods; and now it is fine and impriſonment, and never more to be capable of bearing teſtimony. But the ſtatute 5 Eliſ. c. 9. (if the offender be proſecuted thereon) inflicts the penalty of perpetual infamy, and a fine of 40 l. on the ſuborner; and in default of payment, impriſonment for ſix months, and to ſtand with both ears nailed to the pillory. Perjury itſelf is thereby puniſhed with ſix months impriſonment, perpetual infamy, and a fine of 20 l. or to have both ears nailed to the pillory. But the proſecution is uſually carried on for the offence at common law; eſpecially as, to the penalties before inflicted, the ſtatute 2 Geo. II. c. 25. ſuperadds a power for the court to order the offender to be ſent to the houſe of correction for a term not exceeding ſeven years, or to be tranſported for the ſame period; and makes it felony, without benefit of clergy, to return or eſcape within the time. It has ſometimes been wiſhed, that perjury, at leaſt upon capital accuſations, whereby another's life has been or might have been deſtroyed, was alſo rendered capital, upon a principle of retaliation; as it is univerſally by the laws of France. And certainly the odiouſneſs of the crime pleads ſtrongly in behalf of the French law. But it is to be conſidered, that there they admit witneſſes to be heard only on the ſide of the proſecution, and uſe the rack to extort a confeſſion from the accuſed. In ſuch a conſtitution, therefore, it is neceſſary to throw the dread of capital puniſhment into the other ſcale, in order to keep in awe the witneſſes for the crown; on whom alone the priſoner's fate depends: ſo naturally does one cruel law beget another. But corporal and pecuniary puniſhments, exile and perpetual infamy, are more ſuited to the genius of the Engliſh law; where the fact is openly diſcuſſed between witneſſes on both ſides, and the evidence for the crown may be contradicted and diſproved by thoſe of the priſoner. Where indeed the death of an innocent perſon has actually been the conſequence of ſuch wilful perjury, it falls within the guilt of deliberate murder, and deſerves an equal puniſhment; which our ancient law in fact inflicted. But the mere attempt to deſtroy life by other means not being capital, there is no reaſon that an attempt by perjury ſhould; much leſs that this crime ſhould, in all judicial caſes, be puniſhed with death. For to multiply capital puniſhments leſſens their effect, when applied to crimes of the deepeſt dye; and, deteſtable as perjury is, it is not by any means to be compared with ſome other offences, for which only death can be inflicted; and therefore it ſeems already (except perhaps in the inſtance of deliberate murder by perjury) very properly puniſhed by our preſent law; which has adopted the opinion of Cicero, derived from the law of the twelve tables, *Perjurii pœna divina, exitium; humana, dedecus.*

PERIPNEUMONY, an inflammation of the lungs. See MEDICINE, n° 289, 290. and FARRIERY, § 5.

PERIZONIUS (James), a very learned and laborious writer, was born at Dam in 1651. He became profeſſor of hiſtory and eloquence at the univerſity of Franeker, when, by his merit and learning, he made that univerſity flouriſh. However, in 1693, he went to Leyden, where he was made profeſſor of hiſtory, eloquence, and the Greek tongue; in which employment he continued till his death, which happened in 1715. He wrote many Diſſertations, and other learned and curious works, particularly *Origines Babylonicæ et Ægyptiacæ*, 2 vols 8vo, &c.

PERMEABLE, a term applied to bodies of ſo looſe a texture as to let ſomething paſs through them.

PERMUTATION, in commerce, the ſame with bartering. In the canon-law, permutation denotes the actual exchange of one benefice for another.

PERMSKI, or PERMIA, a town of the Ruſſian empire, and capital of a province of the ſame name, ſeated on the river Kama between the Dwina and the Oby; E. Long. 55. 50. N. Lat. 70. 26. The province is bounded on the north by the Samoiedes, on the weſt by Zirania and Ulatka, and on the eaſt by Siberia.

PERNAMBUCO, a province of Braſil in South America, bounded on the north by Tamera, on the eaſt by the ocean; on the ſouth by Seregippa, and on the weſt by Tapuyers. It is about 200 miles in length, and 150 in breadth. The Dutch became maſters of it in 1630, but the Portugueſe ſoon retook it from them. It produces a great quantity of ſugar, and the beſt Braſil wood.

PERNIO, a kibe, or chilbain, is a little ulcer, occaſioned by cold in the hands, feet, heels, noſe, and lips. It will come on when warm parts are too ſuddenly expoſed to cold, or when parts from being too cold are ſuddenly expoſed to a conſiderable warmth; and has always a tendency to gangrene, in which it frequently terminates. It moſt commonly attacks children of a ſanguine habit and delicate conſtitution; and may be prevented or removed by ſuch remedies as invigorate the ſyſtem, and are capable of removing any tendency to gangrene in the conſtitution. See MEDICINE, n° 281.

PERONÆUS, in anatomy, is an epithet applied to ſome of the muſcles of the perone or fibula. See ANATOMY, *Table of the muſcles*.

PERORATION, in rhetoric, the epilogue or laſt part of an oration, wherein what the orator had inſiſted on through his whole diſcourſe is urged afreſh with greater vehemence and paſſion. The peroration conſiſts of two parts. 1. Recapitulation; wherein the ſubſtance of what was diffuſed throughout the whole ſpeech is collected briefly and curſorily, and ſummed up with new force and weight. 2. The moving the paſſions; which is ſo peculiar to the peroration, that the maſters of the art call this part *ſedes affectuum*. The paſſions to be raiſed are various, according to the various kinds of oration. In a panegyric, love, admiration, emulation, joy, &c. In an invective, hatred, contempt, &c. In a deliberation, hope, confidence, or fear. The qualities required in the peroration are, that it be very vehement and paſſionate, and that it be ſhort; becauſe, as Cicero obſerves, tears ſoon dry up.

PERONNE, a ſtrong town of France, in Picardy, capital of Santerre. It is ſaid never to have been taken, though often beſieged. It is ſeated on the river Somme, in E. Long. 3. 1. N. Lat. 44. 50.

PERPENDICULAR, in geometry, a line falling directly on another line, ſo as to make equal angles on each ſide. See GEOMETRY.

PERPETUAL, ſomething that endures always, or laſts for ever.

PERPETUAL *Motion*. See MOVEMENT.

PERPIGNAN, a conſiderable town of Rouſillon in France, with a ſtrong citadel, an univerſity, and a biſhop's ſee. It is ſeated on the river Tet; over which there is an handſome bridge, partly in a plain, and partly on a hill, E. Long. 0. 43. N. Lat. 45. 18.

PERQUISITE, in a general ſenſe, ſomething gained by a place over and above the ſettled wages.

PERQUISITE, in law, is any thing gotten by a man's own induſtry, or purchaſed with his money; in contradiſtinction to what deſcends to him from his father or other anceſtor.

PERRAULT (Claude), the ſon of an advocate in parliament, was born at Paris in 1613; and was bred a phyſician, though he never practiſed but among his relations, friends, and the poor. He diſcovered early a particular taſte for the ſciences and fine arts; of which he acquired a conſummate knowledge without the aſſiſtance of a maſter: he excelled in architecture, painting, ſculpture, mathematics, phyſics, and all thoſe arts that relate to deſigning and mechanics. The entrance into the Louvre, which was deſigned by him, is, according to the judgment of Voltaire, one of the moſt auguſt monuments of architecture in the world. M. Colbert put him upon tranſlating Vitruvius into French; which he performed, and publiſhed it in 1673, folio, with figures from his own drawings; which are ſaid to have been more exactly finiſhed than the plates themſelves. When the academy of ſciences was eſtabliſhed, he was one of its firſt members, and was chiefly depended on for mechanics and natural philoſophy. His works are, *Memoirs pour ſervir à l'Hiſtoire naturelle des Animaux*, folio, 1676, with figures; *Eſſais de Phiſique*, 4 vols 12mo, 1688; *Recueil de pluſieurs machines de nouvelle invention*, 4to, 1700, &c. He died in 1688.

PERRAULT (Charles), the brother of Claude, was born at Paris in 1626, with as great a genius for arts, and a greater for letters, than his brother. Colbert choſe him firſt clerk of the buildings, of which he was ſuperintendant, and afterward made him comptroller general of the finances under him. He was one of the firſt members of the academy of the belles lettres and inſcriptions, and was received into the French academy in 1671. His poem, *La Peinture*, printed in 1668, was univerſally admired: that intitled *La ſiecle de Louis le Grand*, in which he exalted the modern authors above the ancient, was a prelude to a war with all the learned. After he had diſengaged himſelf from this conteſt, he applied himſelf to draw up elogies of ſeveral great men of the 17th century, with their portraits, of which he has collected 102. There are other eſteemed works of Perrault.—Beſides theſe there were two other brothers, *Peter* and *Nicholas*, who made themſelves known in the literary world.

PERRON (James Davy Du), a cardinal diſtinguiſhed by his abilities and learning, was born in the canton of Bern in 1556. He was educated by Julian Davy, his father, a very learned Calviniſt, who taught him Latin and the mathematics; after which, he by himſelf became acquainted with the Greek and Hebrew, philoſophy, and the poets. Philip Deſportes, abbot of Tyron, made him known to Henry III. king of France, who conceived a great eſteem for him. Some time after, Du Perron abjured Calviniſm, and afterwards embraced the eccleſiaſtical function; and having given great proofs of his wit and learning, he was choſen to pronounce the funeral oration of Mary queen of Scots. After the murder of Henry III. he retired to the houſe of Cardinal de Bourbon, and took great pains in bringing back the Proteſtants to the church of Rome. Among others, he gained over Henry Spondanus, afterwards biſhop of Pamiers. He alſo chiefly contributed to engage Henry IV. to change his religion; and that prince ſent him to negotiate his reconciliation to the holy ſee, in which he ſucceeded. Du Perron was conſecrated biſhop of Evereaux while he reſided at Rome. On his return to France, he wrote, preached, and diſputed againſt the reformed; particularly againſt Du Pleſſis Mornay, with whom he had a public conference in the preſence of the king at Fontainbleau. He was made cardinal in 1604, by pope Clement VIII. at the ſolicitation of Henry IV. who afterwards nominated him to the archbiſhopric of Sens. The king at length ſent him to Rome with Cardinal Joyeuſe, in order to terminate the diſputes which had ariſen between Paul V. and the Venetians. It is ſaid that this pope had ſuch an high opinion of the addreſs of the cardinal Du Perron, that he uſed to ſay, "Let us pray to God to inſpire the cardinal Du Perron, for he will perſuade us to do whatever he pleaſes." After the death of Henry IV. he retired into the country, where he put the laſt hand to his works; and, ſetting up a printing-houſe, corrected every ſheet himſelf. He died at Paris in 1618. His works were collected after his death; and publiſhed at Paris in 3 vols folio.

PERROT (Nicholas), Sieur d'Ablancourt, one of the firſt geniuſes of his age, was born at Chalons in 1606. After ſtudying philoſophy about three years, he was ſent to Paris to follow the law. At eighteen years of age he was admitted advocate of parliament, and frequented the bar; but he ſoon conceived a diſtaſte for it, and therefore diſcontinued his practice. This diſpleaſed an uncle, but whoſe favour he recovered by quitting the Proteſtant religion. He could not, however, be prevailed upon to take orders in the Romiſh church; and ſome years after, he had a deſire to return to the religion he had abjured. But, that he might not do any thing raſhly, he reſolved to ſtudy philoſophy and divinity. For that purpoſe he choſe for his maſter Mr Stuart a Scotſman and Lutheran, a man of great learning. Almoſt three years he ſpent in the moſt aſſiduous ſtudy; and then ſet out from Paris to Champagne, where he abjured the Roman Catholic, and once more embraced the Proteſtant religion. In 1637 he was admitted a member of the French academy; a little after which, he undertook a tranſlation of Tacitus. Whilſt he was engaged in that laborious taſk, he retired to his ſmall eſtate of Ablancourt, and lived there till his death, in 1664. He was a man of fine underſtanding, of great piety and integrity, and of univerſal learning. Moreri has given a catalogue of his works, the greateſt part of which conſiſt of tranſlations, which ſeemed rather originals.

PERRY, a drink made from pears, in the ſame manner as cyder is from apples. See Cyder.

PERSECUTION, is any pain or affliction which a perſon deſignedly inflicts upon another; and, in a more reſtrained ſenſe, the ſufferings of Chriſtians on account of their religion.

Hiſtorians uſually reckon ten general perſecutions, the firſt of which was under the emperor Nero, 31 years after our Lord's aſcenſion; when that emperor having ſet fire to the city of Rome, threw the odium of that execrable action on the Chriſtians, who under that pretence were wrapped up in the ſkins of wild beaſts, and worried and devoured by dogs; others were crucified, and others burnt alive. The ſecond was under Domitian, in the year 95. In this perſecution St John the apoſtle was ſent to the iſle of Patmos, in order to be employed in digging in the mines. The third began in the third year of Trajan, in the year 100, and was carried on with great violence for ſeveral years. The fourth was under Antoninus the philoſopher, when the Chriſtians were baniſhed from their houſes, forbidden to ſhew their heads, reproached, beaten, hurried from place to place, plundered, impriſoned, and ſtoned. The fifth began in the year 197, under the emperor Severus. The ſixth began with the reign of the emperor Maximinus in 235. The ſeventh, which was the moſt dreadful perſecution that had ever been known in the church, began in the year 250, in the reign of the emperor Decius, when the Chriſtians were in all places driven from their habitations, ſtripped of their eſtates, tormented with racks, &c. The eighth began in the year 257, in the fourth year of the reign of the emperor Valerian. The ninth was under the emperor Aurelian, A. D. 274; but this was very inconſiderable: and the tenth began in the 19th year of Diocleſian, A. D. 303. In this dreadful perſecution, which laſted ten years, houſes filled with Chriſtians were ſet on fire, and whole droves were tied together with ropes and thrown into the ſea.

PERSEPOLIS, formerly the capital of Perſia, ſituated in N. Lat. 30. 30. E. Long. 84°; now in ruins, but remarkable for the moſt magnificent remains of a palace or temple that are to be found throughout the world.—This city ſtood in one of the fineſt plains in Perſia, being 18 or 19 leagues in length, and in ſome places two, in ſome four, and in others ſix leagues in breadth. It is watered by the great river Araxes, now Bendemir, and by a multitude of rivulets beſides. Within the compaſs of this plain, there are between 1000 and 1500 villages, without reckoning thoſe in the mountains, all adorned with pleaſant gardens, and planted with ſhady trees. The entrance of this plain on the weſt ſide has received as much grandeur from nature, as the city it covers could do from induſtry or art. It conſiſts of a range of mountains ſteep and high, four leagues in length, and about two miles broad, forming two flat banks, with a riſing terrace in the middle, the ſummit of which is perfectly plain and even, all of native rock. In this there are ſuch openings, and the terraces are ſo fine and ſo even, that one would be tempted to think the whole the work of art, if the great extent, and prodigious elevation thereof, did not convince one that it is a wonder too great for aught but nature to produce. Undoubtedly theſe banks were the very place where the advanced guards from Perſepolis took poſt, and from which Alexander found it ſo difficult to diſlodge them. One cannot from hence deſcry the ruins of the city, becauſe the banks are too high to be overlooked; but one can perceive on every ſide the ruins of walls and of edifices, which heretofore adorned the range of mountains of which we are ſpeaking. On the weſt and on the north, this city is defended in the

Perſeverance ‖ Perſia.

like manner: ſo that, conſidering the height and evenneſs of theſe banks, one may ſafely ſay, with a late ingenious traveller, that there is not in the world a place ſo fortified by nature. The ancient palace of the kings of Perſia, called by the inhabitants *Chilminar*, i. e. forty columns, is ſituated at the foot of the mountain; the walls of this ſtately building are ſtill ſtanding on three ſides: but as a particular account of the noble remains of antiquity to be met with there would exceed our limits, we muſt refer the reader to Sir John Chardin's travels, or the fifth volume of the Univerſal Hiſtory, where a full deſcription of them is given.

PERSEVERANCE, in theology, a Chriſtian virtue, by which we are enabled to perſiſt in the way of ſalvation to the end.

The final perſeverance of the ſaints is a doctrine much controverted between the Arminians and Calviniſts; the latter of whom maintain that it is impoſſible for grace to be loſt, and conſequently make perſeverance to the end a neceſſary conſequence thereof; while the others imagine, that the moſt confirmed believers are never out of a poſſibility of falling.

PERSEUS, the moſt ancient of all the Greek heroes, founded the city of Mycenæ, of which he became afterwards king, and where he and his poſterity reigned for 100 years. He flouriſhed, according to moſt chronologiſts, 1348 B. C. but, according to Sir Iſaac Newton, only 1028.

Perseus, in aſtronomy. See there, n° 206.

PERSIA, a moſt ancient and celebrated empire of Aſia, extending in length from the mouth of the river Araxes to that of the river Indus, about 1840 of our miles, and in breadth from the river Oxus to the Perſian gulph, about 1080 of the ſame miles. It is bounded on the north by the Caſpian Sea, the river Oxus, and mount Caucaſus; on the eaſt, by the river Indus and the dominions of the Great Mogul; on the ſouth, by the Perſian gulph and the Indian ocean; and on the weſt, by the dominions of the Grand Signior.

1 Different names of the country.

The moſt ancient name of this country was that of *Elam*, or, as ſome write it, *Ælam*, from Elam the ſon of Shem, from whom its firſt inhabitants are deſcended. Herodotus calls its inhabitants *Cephenes;* and in very ancient times the people are ſaid to have called themſelves *Artæi*, and the country where they dwelt *Artæa*. In the books of Daniel, Eſdras, &c. it is called by the names of *Pars*, *Pharas*, or *Fars*, whence the modern name of *Perſia;* but whence thoſe names have been derived, is now uncertain.

That Perſia was originally peopled by Elam the ſon of Shem is univerſally allowed; but before the time of Cyrus we know little or nothing of their hiſtory. This prince is celebrated both by ſacred and profane hiſtorians; but the latter are at no ſmall variance concerning his birth and acceſſion to the throne.

2 Accounts of the birth of Cyrus.

According to Herodotus, Aſtyages, the laſt king of the Medes, being warned in a dream, that the ſon who was to be born of his daughter Mandane, ſhould one day be lord of Aſia, reſolved to marry her, not to a Mede, but to a Perſian. Accordingly, he choſe for her huſband one Cambyſes, a man of a peaceable diſpoſition, and of no very high ſtation. However, about a year after they were married, Aſtyages was frightened by another dream, which made him reſolve to diſpatch the infant as ſoon as it ſhould be born. Hereupon the king ſent for his daughter, and put her under confinement, where ſhe was ſoon after delivered of a ſon. The infant was committed to the care of one Harpagus, with ſtrict orders to deſtroy it in what manner he thought proper. But he, having acquainted his wife with the command he had received, by her advice gave it to a ſhepherd, deſiring him to let it periſh by expoſing it. But the ſhepherd, out of compaſſion, expoſed a ſtill-born child which his wife happened to be then delivered of, and brought up the ſon of Mandane as his own, giving him the name of *Cyrus*.

When the young prince had attained the age of ten years, as he was one day at play with other children of the ſame age, he was choſen king by his companions; and having, in virtue of that dignity, divided them into ſeveral orders and claſſes, the ſon of Artembares, a lord of eminent dignity among the Medes, refuſed to obey his orders; whereupon Cyrus cauſed him to be ſeized, and whipped very ſeverely. The boy ran crying to his father; and he immediately haſtened to the king's palace, loudly complaining of the affront his ſon had received from the ſon of a ſlave, and intreating Aſtyages to revenge, by ſome exemplary puniſhment, the indignity offered to him and his family. Aſtyages, commanding both the herdſman and his ſon to be brought before him, aſked the latter, how he, who was the ſon of ſo mean a man, had dared to abuſe the ſon of one of the chief lords of the kingdom? Cyrus replied, that he had done no more than he had a right to do; for the boys of the neighbourhood having choſen him king, becauſe they thought him moſt worthy of that dignity, and performed what he, veſted with that character, had commanded, the ſon of Artambares alone had ſlighted his orders, and for his diſobedience had ſuffered the puniſhment he deſerved. In the courſe of this converſation Aſtyages happening to recollect, that his grandſon, whom he had ordered to be deſtroyed, would have been about the ſame age with Cyrus, began to queſtion the ſhepherd concerning his ſuppoſed ſon, and at laſt obtained from him a confeſſion of the whole truth.

Aſtyages having now diſcovered Cyrus to be his grandſon, ſent for Harpagus, who alſo confeſſed that he had not ſeen Mandane's ſon deſtroyed, but had given him to the ſhepherd; at which Aſtyages was ſo much incenſed, that, having invited Harpagus to an entertainment, he cauſed him to be ſerved with the fleſh of his own ſon. When he had done, the king aſked him whether he liked his victuals; and Harpagus anſwering, that he had never taſted any thing more delicious, the officers appointed for that purpoſe brought in a baſket, containing the head, hands, and feet of his ſon, deſiring him to uncover the baſket, and take what he liked beſt. He did as they deſired, and beheld the mangled remains of his only child without betraying the leaſt concern, ſo great was the command which he had over his paſſions. The king then aſked him, whether he knew with what kind of meat he had been entertained. Harpagus replied, that he knew very well, and was always pleaſed with what his ſovereign thought fit to ordain; and having thus replied, with a ſurpriſing temper, he collected the mangled parts of his innocent ſon, and went home.

Aſtyages having thus vented his rage on Harpagus, began next to conſult what he ſhould do with Cyrus. The magi, however, eaſed him of his fears with regard to him, by aſſuring him, that as the boy had been once choſen king by his companions, the dream had been already verified, and that Cyrus never would reign in any other ſenſe. The king, being well pleaſed with this anſwer, called Cyrus, and, owning how much he had been wanting in the affection which he ought to have had towards him, deſired him to prepare for a journey into Perſia, where he would find his father and mother in circumſtances very different from thoſe of the poor ſhepherd and his wife with whom he had hitherto lived. Cyrus, on his arrival at his father's houſe, was received with the greateſt joy. When he grew up, he ſoon became popular on account of his extraordinary parts; till at laſt his friendſhip was courted by Harpagus, who had never forgot the cruel treatment he received from Aſtyages. By his means a conſpiracy was formed againſt Aſtyages; who being overthrown in two ſucceſſive engagements, was taken priſoner and confined for life.

The account given by Xenophon of the riſe of Cyrus is much more conſonant to ſcripture; for he tells us, that Babylon was conquered by the united forces of the Medes and Perſians. According to him, Cyrus was the ſon of Cambyſes king of the Medes, and Mandane the daughter of Aſtyages king of Perſia. He was born a year after his uncle Cyaxares, the brother of Mandane. He lived till the age of twelve with his parents in Perſia, being educated after the manner of the country, and inured to fatigues and military exerciſes. At this age he was taken to the court of Aſtyages, where he reſided four years; when the revolt of the Medes and Perſians from the Babylonians happened, and which ended in the deſtruction of the Babylonish empire, as related under the article BABYLON.

3 s war ith the dians.

While Cyrus was employed in the Babyloniſh war, before he attacked the metropolis itſelf, he reduced all the nations of Aſia Minor. The moſt formidable of theſe were the Lydians, whoſe king Crœſus aſſembled a very numerous army, compoſed of all the other nations in that part of Aſia, as well as of Egyptians, Greeks, and Thracians. Cyrus being informed of theſe vaſt preparations, augmented his forces to 196,000 men, and with them advanced againſt the enemy, who were aſſembled near the river Pactolus. After long marches, he came up with them at Thymbra, not far from Sardis the capital of Lydia. Beſides the horſe and foot, which amounted to 196,000, as already obſerved, Cyrus had 300 chariots armed with ſcythes, each chariot drawn by four horſes abreaſt, covered with trappings that were proof againſt all ſorts of miſſive weapons: he had likewiſe a great number of chariots of a larger ſize, upon each of which was placed a tower about 18 or 20 feet high, and in each tower were lodged 20 archers. Theſe towers were drawn by 16 oxen yoked abreaſt. There was moreover a conſiderable number of camels, each mounted by two Arabian archers, the one looking towards the head, and the other towards the hinder part of the camel. The army of Crœſus conſiſted of 420,000 men. The Egyptians, who alone were 120,000 in number, being the main ſtrength of the army, were placed in the centre. Both armies were drawn up in an immenſe plain, which gave room for the extending of the wings on either ſide; and the deſign of Crœſus, upon which alone he founded his hopes of victory, was to ſurround and hem in the enemy's army.

4 The battle of Thymbra.

When the two armies were in ſight of each other, Crœſus, obſerving how much his front exceeded that of Cyrus, made the centre halt, but commanded the two wings to advance, with a deſign to incloſe the Perſian army, and begin the attack on both ſides at once. When the two detached bodies of the Lydian forces were ſufficiently extended, Crœſus gave the ſignal to the main body, which marched up to the front of the Perſian army, while the two wings attacked them in flank; ſo that Cyrus's army was hemmed in on all ſides, and, as Xenophon expreſſes it, was incloſed like a ſmall ſquare drawn within a great one. This motion, however, did not at all alarm the Perſian commander; but, giving his troops the ſignal to face about, he attacked in flank thoſe forces that were going to fall upon his rear, ſo vigorouſly, that he put them into great diſorder. At the ſame time a ſquadron of camels was made to advance againſt the enemy's other wing, which conſiſted moſtly of cavalry. The horſes were ſo frightened at the approach of theſe animals, that moſt of them threw their riders and trod them under foot; which occaſioned great confuſion. Then Artageſes, an officer of great valour and experience, at the head of a ſmall body of horſe, charged them ſo briſkly, that they could never afterwards rally; and at the ſame time the chariots, armed with ſcythes, being driven in among them, they were entirely routed. Both the enemy's wings being thus put to flight, Cyrus commanded his chief favourite Abradates to fall upon the centre with the large chariots abovementioned. The firſt ranks, conſiſting moſtly of Lydians, not being able to ſtand ſo violent a charge, immediately gave way; but the Egyptians, being covered with their bucklers, and marching ſo cloſe that the chariots had not room to penetrate their ranks, a great ſlaughter of the Perſians enſued. Abradates himſelf was killed, his chariot overturned, and the greateſt part of his men were cut in pieces. Upon his death, the Egyptians, advancing boldly, obliged the Perſian infantry to give way, and drove them back quite to their engines. There they met with a new ſhower of darts and javelins from their machines; and at the ſame time the Perſian rear advancing ſword in hand, obliged their ſpearmen and archers to return to the charge. In the mean time Cyrus, having put to flight both the horſe and foot on the left of the Egyptians, pushed on to the centre, where he had the misfortune to find his Perſians again giving ground; and judging that the only way to ſtop the Egyptians, who were purſuing them, would be to attack them in the rear, he did ſo; and at the ſame time the Perſian cavalry coming up to his aſſiſtance, the fight was renewed with great ſlaughter on both ſides. Cyrus himſelf was in great danger; for his horſe being killed under him, he fell among the midſt of his enemies: but the Perſians, alarmed at the danger of their general, threw themſelves headlong on their opponents, reſcued him, and made a terrible ſlaughter; till at laſt Cyrus, admiring the valour of the Egyptians, offered them honourable conditions; letting them know at the ſame time, that all their allies had abandoned them. They accepted the terms offered them; and having agreed with Cyrus that they ſhould not be obliged to carry arms againſt Crœſus, they engaged in the ſervice of the conqueror, and continued faithful to him ever after.

5
Sardis taken, and the Lydian empire overthrown.

The next morning Cyrus advanced towards Sardis, and Crœſus marched out to oppoſe him at the head of the Lydians only; for his allies had all abandoned him. Their ſtrength conſiſted moſtly in cavalry: which Cyrus being well appriſed of, he ordered his camels to advance; by whom the horſes were ſo frightened, that they became quite ungovernable. However, the Lydians diſmounted, and for ſome time made a vigorous reſiſtance on foot; but were at laſt driven into the city, which was taken two days after: and thus the Lydian empire was totally deſtroyed.

6
Reduces Babylon.

7
His death.

After the conqueſt of Sardis, Cyrus turned his arms againſt Babylon itſelf, which he reduced in the manner related under that article. Having ſettled the civil government of the conquered kingdoms, Cyrus took a review of all his forces, which he found to conſiſt of 600,000 foot, 120,000 horſe, and 2000 chariots armed with ſcythes. With theſe he extended his dominion all over the nations to the confines of Ethiopia, and to the Red Sea; after which he continued to reign peaceably over his vaſt empire till his death, which happened about 529 before Chriſt. According to Xenophon, he died a natural death; but others tell us, that, having engaged in a war with the Scythians, he was by them overthrown and cut in pieces with his whole army, amounting to 200,000 men. But this is very improbable, ſeeing all authors agree, that the tomb of Cyrus was extant at Paſargada in Perſia in the time of Alexander the Great; which it could not have been, if his body had remained in the poſſeſſion of the Scythians, as theſe authors aſſert.

In the time of Cyrus, the Perſian empire extended from the river Indus to the Egean ſea. On the north it was bounded by the Euxine and Caſpian ſeas, and on the ſouth by Ethiopia and Arabia. That monarch kept his reſidence for the ſeven cold months at Babylon, by reaſon of the warmth of that climate; three months in the ſpring he ſpent at Suſa, and two at Ecbatan during the heat of ſummer. On his death-bed he appointed his ſon Cambyſes to ſucceed him in the empire; and to his other ſon, Smerdis, he gave ſeveral conſiderable governments. The new monarch immediately ſet about the conqueſt of Egypt; which he accompliſhed in the manner related in the hiſtory of that country.

8
Cambyſes conquers Egypt.

Having reduced Egypt, Cambyſes next reſolved to turn his arms againſt the Carthaginians, Hammonians, and Ethiopians. But he was obliged to drop the firſt of theſe enterprizes, becauſe the Phœnicians refuſed to ſupply him with ſhips againſt the Carthaginians, who were a Phœnician colony. However, he ſent ambaſſadors into Ethiopia with a deſign to get intelligence of the ſtate and ſtrength of the country. But the Ethiopian monarch, being well appriſed of the errand on which they came, treated them with great contempt. In return for the preſents ſent him by Cambyſes, he ſent his own bow; and adviſed the Perſians to make war upon the Ethiopians when they could bend ſuch a ſtrong bow as eaſily as he did, and to thank the gods that the Ethiopians had no ambition to extend their dominions beyond their own country.

9
His unſucceſsful expedition againſt E thiopia an the Hammonians.

Cambyſes was no ſooner informed of this anſwer by his ambaſſadors, than he flew into a violent paſſion; and ordered his army immediately to begin their march, without conſidering that they were neither furniſhed with proviſions nor any other neceſſary. When he arrived at Thebes in Upper Egypt, he detached 50,000 men, with orders to deſtroy the temple of Jupiter Ammon: but all theſe periſhed in the deſart; not a ſingle perſon arriving either at the oracle, or returning to Thebes. The reſt of the army, led by Cambyſes himſelf, experienced incredible hardſhips; for, not being provided with any neceſſaries, they had not marched a fifth part of the way when they were obliged to kill and eat their beaſts of burthen. When theſe failed, the ſoldiers fed on graſs and roots, as long as any could be found; and at laſt were reduced to the dreadful neceſſity of eating one another; every tenth man, on whom the lot fell, being condemned to ſerve as food for his companions. The king, however, obſtinately perſiſted in his deſign; till, being apprehenſive of the danger he himſelf was in, he retreated to Thebes, after having loſt the greateſt part of his army.

10
He murders his brother

Cambyſes was a man of a very cruel and ſuſpicious temper, of which he gave many inſtances; and the following proved indirectly the cauſe of his death.—We have already obſerved that the king of Ethiopia ſent his bow in return for the preſents brought to him by the ambaſſadors of Cambyſes. The only man in the Perſian army who could bend this bow was Smerdis the king's brother; and this inſtance of his perſonal ſtrength ſo alarmed the tyrant, that, without any crime alleged, he cauſed him to be murdered. This gave occaſion to one Smerdis, a magi, who greatly reſembled the other Smerdis in looks, to aſſume the name of the deceaſed prince, and to raiſe a rebellion againſt Cambyſes who was generally hated for his cruelty; and this he could the more eaſily do, as the chief management of affairs had been committed to this Smerdis during the king's abſence. Cambyſes, on receiving the news of this revolt, immediately ordered his army to march, in order to ſuppreſs it; but as he was mounting his horſe, his ſword, ſlipping out of its ſcabbard, wounded him in the thigh. On this accident, he aſked the name of the city where he was; and being told that it was *Ecbatan*, he ſaid in the preſence of all his attendans, " Fate has decreed, that Cambyſes the ſon of Cyrus ſhall die in this place." For, having conſulted the oracle of Butus, which was very famous in that country, he was told that he ſhould die at Ecbatan. This he had always underſtood of Ecbatan in Media, and had therefore reſolved to avoid it. Being now, however, convinced that his end approached, he aſſembled the chief Perſian lords who ſerved in the army, and having told them that his brother was certainly dead, he exhorted them never to ſubmit to the impoſtor, or ſuffer the ſovereignty again to paſs from the Perſians to the Medes, to which nation Smerdis belonged, but to uſe their utmoſt endeavours to place one of their own blood on the throne.

11
His death.

As the king's wound mortified, he lived but a few days after this; but the aſſembly ſuppoſing that he had ſpoken only out of hatred to his brother, quietly ſubmitted to the impoſtor, who was thus for a time eſta-

12 eign of merdis the agi.

eſtabliſhed on the throne. Indeed, from his conduct during the ſhort time which he enjoyed the kingdom, he appears to have been not at all undeſerving of a crown. He began with granting to all his ſubjects an exemption from taxes and military ſervice for three years, and treated all of them in the moſt beneficent manner. To ſecure himſelf on the throne the more effectually, he married Atoſſa the daughter of Cyrus; thinking, that, in caſe of a diſcovery, he might hold the empire by her title. She had before been married to her brother Cambyſes, on a deciſion of the magi that a king of Perſia might do as he pleaſed; and by virtue of this deciſion Smerdis alſo married her as her brother.

13 is impo- ure diſco- ered.

The extreme caution of Smerdis, however, promoted the diſcovery of his impoſture. He had married all his predeceſſor's wives, among whom was one Phedyma, the daughter of Otanes a Perſian nobleman of the firſt rank. Otanes, who ſuſpected that the king was not Smerdis the ſon of Cyrus, ſent a truſty meſſenger to his daughter, deſiring to know whether he was ſo or not; but Phedyma, having never ſeen this Smerdis, could not give any anſwer. Her father then deſired her to inquire at Atoſſa, who could not but know her own brother. However, he was again diſappointed; for Phedyma acquainted him that all the kings wives were lodged in diſtinct and ſeparate appartments, without being allowed to ſee each other. This greatly increaſed the ſuſpicions of Otanes; upon which he ſent his daughter a third meſſage, deſiring her, the next time ſhe ſhould be admitted to the king's bed, to take an opportunity of feeling whether he had ears or not: for Cyrus had formerly cauſed the ears of Smerdis the magi to be cut off for ſome crime of which he had been guilty; ſo that, if the king had ears, ſhe might then be aſſured that he was Smerdis the ſon of Cyrus.

14 A conſpi- acy form- d againſt im.

The event ſhewed that the ſuſpicions of Otanes were juſt; and Phedyma having acquainted her father that the king had no ears, a conſpiracy was immediately formed againſt him. While the conſpirators were debating about the proper means of carrying their deſigns into execution, Darius the ſon of Hyſtaſpes happening to arrive at Suſa where his father was governor, they all agreed to make him privy to their deſign. He told them, at their firſt meeting, that he thought nobody in the empire but himſelf had known that Smerdis the ſon of Cyrus was dead, and the throne uſurped by a magi; that he had come with a deſign to kill the uſurper, without imparting his deſign to any one, that the glory of ſuch an action might be entirely his own. But ſince others were appriſed of the impoſture, he inſiſted that the uſurper ſhould be diſpatched without delay. Otanes, on the other hand, was for putting off the enterpriſe till ſome better opportunity offered; but Darius proteſted, that if they did not make the attempt that very day, he would prevent any one from accuſing him, by diſcloſing the whole matter to the magi himſelf.

In the mean time, Smerdis and his brother had by great promiſes prevailed on Prenaſpes (the executioner of the true Smerdis) to bind himſelf by an oath not to diſcover the fraud they had put on the Perſians, and even to make a public ſpeech, declaring that the preſent king of Perſia was really the ſon of Cyrus. At the time appointed, he began his diſcourſe with the genealogy of Cyrus, putting his hearers in mind of the great favours the nation had received from that prince. After having extolled Cyrus and his family, to the great aſtoniſhment of all preſent, he confeſſed the whole tranſaction with regard to the death of Smerdis; telling the people, that the apprehenſions of the danger he muſt inevitably run by publiſhing the impoſture had conſtrained him to conceal it ſo long; but now, not being able any longer to act ſuch a diſhonourable part, he acknowledged that he had been compelled by Cambyſes to put his brother to death with his own hand, and that the perſon who poſſeſſed the throne was Smerdis the Magi. He then begged pardon of the gods and men for the crime he had committed; and fulminating many imprecations againſt the Perſians if they failed to recover the ſovereignty, he threw himſelf headlong from the top of the tower on which he ſtood, and died on the ſpot.

15 He is killed.

In the mean time the conſpirators, who were advancing towards the palace, were informed of what had happened; and Otanes was again for deferring the execution of their enterpriſe: but Darius inſiſting upon the danger of delay, they proceeded boldly to the palace; and being admitted by the guards, who did not ſuſpect them, they killed both the uſurper and his brother; after which, they expoſed their heads to the people, and declared the whole impoſture. The Perſians at this were ſo enraged, that they fell on the whole ſect, and killed every one of the magi they could meet with; and had not the ſlaughter been ſtopped by night, not one of the order would have been left alive. The day on which this ſlaughter happened was afterwards celebrated by the Perſians with the greateſt ſolemnity, and called by the name of *Magophonia*, or the *ſlaughter of the Magi*. On that feſtival the magi durſt not appear abroad, but were obliged to ſhut themſelves up in their houſes. Smerdis the magi reigned only eight months.

When the tumult was a little ſubſided, the conſpirators, who were ſeven in number, met together in order to elect a new king, or to determine what form of government they ſhould next introduce. Otanes was for a republic: but being over-ruled by the reſt, he declared, that as he was determined not to be a king, neither would he be ruled by one; and therefore inſiſted that he and his family ſhould ever afterwards remain free from ſubjection to the royal power. This was not only granted, but it was further agreed by the other ſix, that whoever was choſen ſhould every year preſent Otanes with a Median veſt, a mark of great diſtinction among the Perſians, becauſe he had been the chief author of the enterpriſe. They further agreed to meet at a certain place next morning at ſunriſe on horſeback, and that he whoſe horſe firſt neighed ſhould be king.

16 Darius Hyſtaſpes choſen king.

This being overheard by Oebores, who had the care of Darius's horſes, he led a mare over-night to the place, and brought his maſter's horſe to her. The next morning, the horſe remembering the place, immediately neighed for the mare; and the five lords diſmounting, adored Darius as their king.

Darius Hyſtaſpes was elected king of Perſia in the year 522 B. C. Immediately after his acceſſion, he promoted the other ſix conſpirators to the firſt employments in the kingdom, married the two daughters of Cyrus, Atoſſa and Artyſtona, Parmys the daughter of the true Smerdis, and Phedyma the daughter of Otanes,

tanes, who had detected the magi. He then divided the whole empire into 20 ſatrapies or governments, and appointed a governor over each diviſion, ordering them to pay him an annual tribute. The inhabitants of Colchis, with ſome others, were enjoined only to make annual preſents, and the Arabians to furniſh every year ſuch a quantity of frankincenſe as equalled the weight of 1000 talents. Thus Darius received the yearly tribute of 14,560 Eubæic talents, upwards 260,000 pounds Sterling.

17 Revolt of the Babylonians.

Under Darius, the building of the temple of Jeruſalem, which had been obſtructed by Cambyſes and Smerdis, went on ſucceſsfully, and the Jewiſh ſtate was entirely reſtored. The moſt remarkable of Darius's other tranſactions were his expeditions againſt Babylon; againſt Scythia, India, and Greece. The expedition againſt Babylon took place in the 517 B. C. when that people, unable to bear the oppreſſion of the Perſians, and likewiſe diſcontented becauſe the ſeat of government was removed from their city to Suſa in Perſia, took the opportunity of the troubles which happened in the reigns of Cambyſes and Smerdis, to ſtore their city with all kinds of proviſions ſufficient to ſerve them for many years; after which they broke out into an open rebellion, and this quickly brought upon them Darius with all his forces. The Babylonians perceiving themſelves ſhut up by ſo numerous an army, turned all their thoughts towards the ſupporting of a long ſiege, which they imagined would tire out the king's troops. To prevent the conſumption of their proviſions, they took the moſt barbarous and cruel reſolution that ever was put in execution by any nation. They agreed among themſelves to get rid of all unneceſſary mouths; and therefore, gathering together all the old men, women, and children, they ſtrangled them without diſtinction; every one being allowed only to keep the wife he liked beſt, and a maid-ſervant to do the work of the houſe. The ſiege continued for a year and eight months; nor was there any likelihood of its being ended, when Zopyrus, one of Darius's chief commanders, put him in poſſeſſion of it by the following ſtratagem. He cut off his noſe and ears, and having mangled his body with ſtripes in a moſt cruel manner, he fled to the Babylonians thus diſfigured, pretending that he had been ſo treated by Darius, for adviſing him to raiſe the ſiege. Being intruſted with the command of ſome forces, he cut off ſeveral parties of the Perſian army, whom Darius thus ſacrificed in order to raiſe the character of Zopyrus the higher among the Babylonians. In this manner he ſo much eſtabliſhed his credit, that at laſt he was made commander in chief of all the Babyloniſh forces, and the guard of the city committed entirely to his care; and no ſooner was this done, than he delivered it up to Darius, who, to prevent their rebelling a ſecond time, beat down the walls of that metropolis to the height of 50 cubits. Three thouſand of the moſt active in the rebellion were impaled; the reſt pardoned. As they had deſtroyed moſt of their women, the neighbouring nations were commanded to furniſh them with wives, and 50,000 women were ſent to that city, by which means it was prevented from being depopulated. Zopyrus was rewarded with the higheſt honours, and had the whole revenues of Babylon beſtowed on him for life.

18 His unſucceſsful expedition againſt the Scythians.

After the reduction of Babylon, Darius undertook a Scythian expedition, directed againſt thoſe nations which lie between the Danube and the Tanais. His pretext for this war was, to revenge the calamities which theſe nations had brought upon Aſia about 120 years before, when they invaded and ſubdued Media; keeping it in ſubjection for the ſpace of 28 years, as we have related under that article. In this expedition he was attended with an army of 700,000 men. With theſe he marched to the Thracian Boſphorus; which having paſſed on a bridge of boats, he reduced all Thrace. From Thrace he advanced to the Danube, where he had appointed his fleet to meet him. This river he paſſed on another bridge of boats, and entered Scythia. His enemies, however, were too wiſe to oppoſe ſuch a formidable power in the open field; and therefore retired before him, waſting the country as they went along, till at laſt the king, ſenſible of the danger he was in, reſolved to give over the enterpriſe and return home. In order to do ſo with ſafety, he lighted a great number of fires in the night-time, and decamped; leaving behind him the old men and the ſick, who fell into the hands of their enemies. The Scythians perceiving that Darius was gone, detached a conſiderable body to the bridge over the Danube; and as they were well acquainted with the roads, they got thither before the Perſians. The Scythians had ſent expreſſes before-hand to perſuade the Ionians, whom Darius had left to guard the bridge, to break it down and retire to their own country; and this they preſſed the more earneſtly, that as the time preſcribed by Darius was now expired, they were at liberty to return home, without breaking their word or being wanting in their duty. Miltiades, prince of the Cherſoneſus of Thrace, was for embracing ſo favourable an opportunity of cutting off Darius's retreat, and ſhaking off the Perſian yoke at once: all the other commanders agreed with him, except Hyſtiæus prince of Miletus; who repreſented to the Ionian chiefs, that their power was connected with that of Darius, ſince it was under his protection that each of them was lord in his own city; and that the cities of Ionia would not fail to depoſe them and recover their liberty, if the Perſian power ſhould ſink or decline. This ſpeech made a deep impreſſion on the reſt, and it was at laſt determined that they ſhould wait for Darius; and in order to deceive the Scythians, they began to break down the bridge, but adviſed them to return back and defeat Darius. They did ſo, but miſſed him; and he having thus ſafely eſcaped ſo great a danger, immediately repaſſed the Boſphorus, and took up his winter-quarters at Sardis, leaving Megabyzus, one of his chief generals, to complete the conqueſt of Thrace.

19 He conquers India.

The king having ſufficiently refreſhed his troops, who had ſuffered extremely in the Scythian expedition, began to think of extending his dominions eaſtward; and, in order to facilitate his deſign, reſolved in the firſt place to diſcover thoſe countries. With this view, he cauſed a fleet to be built and equipped at Caſpatyrus, a city on the river Indus. The command of this fleet he gave to one Scylax, a Grecian of Caryandia a city of Caria, who was well verſed in maritime affairs. Him he ordered to ſail down the current, and make the beſt diſcoveries he could of the countries lying on either ſide of the river, till he arrived at the ſouthern

Perſia.

ſouthern ocean; from whence he was to ſteer his courſe weſtward, and that way return to Perſia. Scylax, having exactly obſerved his inſtructions, and ſailed down the river Indus, entered the Red Sea by the ſtraits of Babelmandel, and on the 30th month from his firſt ſetting out, landed at the ſame place from whence Necho king of Egypt formerly ſent out the Phœnicians who circumnavigated Africa. From hence Scylax returned to Suſa, where he gave a full account of his diſcoveries; upon which Darius, marching into India at the head of a powerful army, reduced that large country, and made it a province of the Perſian empire, drawing from thence an annual tribute of 360 talents of gold.

20
volt of
Ionians,

Soon after the expedition of Darius againſt India, happened the revolt of the Ionians, which gave occaſion to his expedition into Greece; an account of which is given under the articles ATTICA, GREECE, SPARTA, &c. The ill ſucceſs which attended him here, however, was ſo far from making him drop the enterpriſe, that it only made him the more intent on reducing the Grecians; and he reſolved to head his army in perſon, having attributed his former bad ſucceſs to the inexperience of his generals. But while he was employed in making the neceſſary preparations for this purpoſe, he received intelligence that the Egyptians had revolted, ſo that he was obliged to make preparations for reducing them alſo; and before this could be done, the king died, after having reigned 36 years, leaving the throne to his ſon Xerxes.

21
xpedi-
ns of
rxes a-
inſt E-
pt and
eece.

This prince aſcended the throne of Perſia in the year 485 B. C.; and his firſt enterpriſe was to reduce the Egyptians; which he effectually did, bringing them into a worſe ſtate of ſlavery than they ever had experienced before. After this he reſolved on an expedition into Greece, the unfortunate event of which is related under the article ATTICA. By his misfortunes in the Grecian expedition, he became at laſt ſo diſpirited, that he thenceforth abandoned all thoughts of war and conqueſts; but growing tyrannical, and oppreſſing his ſubjects, he was murdered in his bed, in the year 464 B. C. the 21ſt of his reign; and was ſucceeded by his third ſon Artaxerxes, ſurnamed *Longimanus* on account of the great length of his arms.

22
rxes ſuc-
ded by
taxerxes
ngima-

This prince is named *Ahaſuerus* in ſcripture, and is the ſame who married Eſther, and during the whole of his reign ſhewed the greateſt kindneſs to the Jewiſh nation. In the beginning of his reign he was oppoſed by Hyſtaſpes the ſecond ſon of Xerxes, whom, however, he overcame, though not without conſiderable difficulty. After this he applied himſelf to the ſettlement of the affairs of government, and reforming many abuſes which had crept in; and then, being fully eſtabliſhed on the throne, he appointed feaſts and rejoicings to be made for 180 days in the city of Suſa; at one of which he reſolved to divorce his queen for diſobedience; and afterwards married Eſther, as we find it recorded in the ſacred writings.

In the fifth year of the reign of Artaxerxes the Egyptians revolted anew, and, being aſſiſted by the Athenians, held out for ſix years; but were again obliged to ſubmit, and continued in ſubjection during the whole of his reign. Nothing elſe remarkable happened during the life of Artaxerxes Longimanus, who died in the 41ſt year of his reign; and was ſucceeded by Xerxes II. the only ſon he had by his queen, though by his concubines he had 17. Xerxes having drunk immoderately at an entertainment immediately after his acceſſion, retired to a chamber, in order to refreſh himſelf with ſleep; but here he was murdered by Sogdianus, the ſon of Artaxerxes by one of his concubines, after he had reigned 45 days.

23
Xerxes II.

24
Sogdianus.

Sogdianus was ſcarce ſeated on the throne when he put to death Bagorazus, the moſt faithful of all his father's eunuchs; by which, and the murder of his ſovereign, he became generally odious. Upon this, ſenſible of the dangerous ſituation in which he was, he ſent for one of his brothers named *Ochus*, whom he ſuſpected, with a deſign to murder him the moment he arrived. Ochus, however, underſtanding his deſign, put off, by ſeveral pretences, his coming, till he had drawn together a powerful army, with which he advanced to the confines of Perſia. Here he openly declared, that his deſign was to revenge his brother's death; which brought over to him many of the nobility and governors of provinces, by whom he was immediately proclaimed king. Sogdianus, ſeeing himſelf thus deſerted, contrary to the advice of all his friends, came to an accommodation with Ochus; who no ſooner had him in his power than he cauſed him to be ſuffocated among aſhes; a puniſhment invented on purpoſe for him.

25
Ochus.

Ochus being firmly ſettled on the throne by the death of Sogdianus, changed his name to Darius; and is by hiſtorians commonly called *Darius Nothus*, or the *Baſtard*. But Arſites, another of the brothers, ſeeing in what manner Sogdianus had got the better of Xerxes, and been afterwards driven out by Ochus, began to entertain thoughts of treating him in the ſame manner. He was not, however, ſo ſucceſsful; for, being defeated in an engagement, he ſurrendered himſelf in hopes of mercy, but was immediately put to death by ſuffocation in aſhes. Several other perſons were executed: but theſe ſeverities did not procure him the repoſe which he expected; for his whole reign was diſturbed with violent commotions in various parts of the empire. One of the moſt dangerous was raiſed by Piſuthna governor of Lydia; but he being deſerted by his Greek mercenaries, was at laſt overcome, and put to death: however, his ſon Amorgas continued to infeſt the maritime provinces of Aſia Minor for two years; till he alſo was taken priſoner by Tiſſaphernes, the new governor of Lydia, who put him to death. Other inſurrections quickly followed this: but the greateſt misfortune which befel Darius during the whole courſe of his reign was the revolt of the Egyptians, who could not be reduced. Before his death, he inveſted Cyrus his youngeſt ſon with the ſupreme government of all the provinces of Aſia Minor. This was done through the perſuaſions of his mother Paryſatis, who had an abſolute ſway over her huſband; and ſhe procured this command for him, that he might thereby be enabled to contend for the kingdom after his father's death. She even inſiſted that the king ſhould declare him heir to the crown before he died; but this he could not by any means be induced to do. He died in the year 405 B. C. and was ſucceeded by his ſon Artaxerxes, by the Greeks ſurnamed *Mnemon*, on account of his extraordinary memory.

26
Artaxerxes
Mnemon.

27
Revolt of Cyrus the younger.

28
Battle of Cunaxa.

The moſt remarkable tranſaction which happened during the reign of this prince was the revolt of his brother Cyrus. This young prince had been raiſed to ſo great power through the intereſt of his mother, on purpoſe that he might revolt, as we have already ſeen. He began with gaining over the cities under the government of Tiſſaphernes; which quickly produced a war with that governor. Cyrus then began to aſſemble troops, which he pretended were deſigned only againſt Tiſſaphernes. As he had given great aſſiſtance to the Lacedæmonians in their wars againſt the Athenians, he now in return demanded aſſiſtance from them: which requeſt they very readily complied with, ordering their fleet immediately to join him, and to obey in every thing the commands of Tamos his admiral. At laſt Cyrus, having collected an army of 13,000 Greek mercenaries and 100,000 regular troops of other nations, ſet out from Sardis, directing his march towards Upper Aſia; the army being entirely ignorant of the expedition on which they were going. When they arrived at Tarſus, the Greeks, ſuſpecting that they were marching againſt the king, refuſed to proceed any further; but Cyrus having gained them over with preſents and promiſes, they ſoon went on with ſatisfaction. Having arrived at Cunaxa in the province of Babylon, Cyrus found his brother with 900,000 men ready to engage him. Whereupon, leaping out of his chariot, he commanded his troops to ſtand to their arms and fall into their ranks; which was done with great expedition, no time being allowed the ſoldiers to refreſh themſelves. Clearchus, the commander of the Pelopponneſian troops, adviſed Cyrus not to charge in perſon, but to remain in the rear of the Greek battalions; but this advice he rejected with indignation, ſaying, that he ſhould thus render himſelf unworthy of the crown for which he was fighting. As the king's army drew near, the Greeks fell upon them with ſuch fury, that they routed the wing oppoſite to them almoſt at the firſt onſet; upon which Cyrus was with loud ſhoots proclaimed king by thoſe who ſtood next to him. But he, in the mean time, perceiving that Artaxerxes was wheeling about to attack him in flank, advanced againſt him with 600 choſen horſe, killed Artageſes captain of the king's guards with his own hand, and put the whole body to flight. In this encounter, diſcovering his brother, he ſpurred on his horſe, and, coming up to him, engaged him with great fury; which in ſome degree turned the battle into a ſingle combat. Cyrus killed his brother's horſe, and wounded himſelf on the ground; but he immediately mounted another horſe, when Cyrus attacked him again, gave him a ſecond wound, and had already lifted up his hand to give him a third, when the guards, perceiving the danger in which their king was, diſcharged their arrows at once againſt his antagoniſt, who at the ſame time throwing himſelf headlong upon his brother, was pierced through by his javelin. He fell dead upon the ſpot; and all the chief lords of his court, reſolving not to ſurvive him, were ſlain in the ſame place.

In the mean time, the Greeks having defeated the enemy's left wing commanded by Tiſſaphernes, and the king's right wing having put to flight Cyrus's left, both parties, being ignorant of what had paſſed elſewhere, imagined that they had gained the victory. But Tiſſaphernes acquainting the king that his men had been put to flight by the Greeks, he immediately rallied his troops in order to attack them. The Greeks, under the command of Clearchus, eaſily repulſed them, and purſued them them to the foot of the neighbouring hills. As night was drawing near, they halted at the foot of the hill, much ſurpriſed that neither Cyrus himſelf, nor any meſſenger from him, had appeared; for as yet they knew nothing of his death and the defeat of the reſt of the army. They determined therefore to return to their camp, which they did accordingly; but found there that the greateſt part of their baggage had been plundered, and all their proviſions taken, which obliged them to paſs the night in the camp without any ſort of refreſhment. The next morning, as they were ſtill expecting to hear from Cyrus, they received the news of his death, and the defeat of that part of the army. Whereupon they ſent deputies to Ariæus, who was commander in chief of all the other forces of Cyrus, offering him, as conquerors, the crown of Perſia. Ariæus rejected the offer, and acquainting them that he intended to ſet out early in the morning on his return to Ionia, adviſed them to join him in the night. They followed his directions, and, under the conduct of Clearchus, began their march, arriving at his camp about midnight, whence they ſet out on their return to Greece. They were at a vaſt diſtance from their own country, in the very heart of the Perſian empire, ſurrounded by a victorious and numerous army, and had no way to return again but by forcing their way through an immenſe track of the enemy's country. But their valour and reſolution maſtered all theſe difficulties; and, in ſpite of a powerful army, which purſued and harraſſed them all the way, they made good their retreat for 2325 miles through the provinces belonging to the enemy, and got ſafe to the Greek cities on the Euxine ſea. This retreat, (the longeſt that ever was made through an enemy's country) was conducted at firſt by Clearchus; but he being cut off through the treachery of Tiſſaphernes, Xenophon was choſen in his room, who at laſt brought his men ſafe into Greece: but for a full account of that famous retreat, ſee the article XENOPHON.

29
Retreat of ten thouſand Gre

30
War with the Laced monians.

The war with Cyrus was ſcarce ended, when another broke out with the Lacedæmonians, on the following account. Tiſſaphernes being appointed to ſucceed Cyrus in all his power, to which was added all which he himſelf poſſeſſed formerly, began to oppreſs the Greek cities in Aſia in a moſt cruel manner. On this they ſent ambaſſadors to Sparta, deſiring the aſſiſtance of that powerful republic. The Spartans having ended their long war with the Athenians, willingly laid hold of the preſent opportunity of breaking again with the Perſians, and therefore ſent againſt them an army under the command of Thimbro, who, being ſtrengthened by the forces which returned under Xenophon, took the field againſt Tiſſaphernes. But Thimbro being ſoon recalled upon ſome complaints, Dercyllidas, a brave officer and experienced engineer, was appointed to ſucceed him; and he carried on the war to much more advantage than his predeceſſor. On his arrival in Aſia, finding that Tiſſaphernes was at variance with another governor named *Pharnabazus*, he concluded a truce with the former, and marching againſt Pharnabazus, drove him quite out of Æolis, and took ſeveral cities in other parts. The latter, however, immediately repaired to the Perſian court, where he made loud complaints againſt Tiſſaphernes, but gave the king a moſt ſalutary advice, which was to equip a powerful fleet, and give the command of it to Conon the Athenian, the beſt ſea-officer of his time, by which means he would obſtruct the paſſage of further recruits from Greece; and thus ſoon put an end to the power of the Lacedæmonians in Aſia. This advice being approved of, the king ordered 500 talents for the equipment of a fleet, with directions to give Conon the command of it.

In the mean time, Darcyllidas, with all his valour and ſkill, ſuffered himſelf to be drawn into ſuch a diſadvantageous ſituation, that he muſt inevitably have been deſtroyed with his whole army, had it not been through the cowardice of Tiſſaphernes, who, having experienced the Grecian valour at the battle of Cunaxa, could not by any means be induced to attack them. The Lacedæmonians, however, having heard that the Perſian monarch was fitting out a great fleet againſt them, reſolved to puſh on the war as vigorouſly as poſſible; and for this purpoſe ſent over Ageſilaus one of their kings, and a moſt experienced commander, into Aſia. This expedition was carried on with ſuch ſecrecy, that Ageſilaus arrived at Epheſus before the Perſians had the leaſt notice of his deſigns. Here he took the field with 10,000 foot and 4000 horſe, and falling upon the enemy while they were totally unprepared, carried every thing before him. Tiſſaphernes deceived him into a truce till he had leiſure to aſſemble his forces, but gained little by his treachery; for Ageſilaus deceived him in his turn, and, while Tiſſaphernes marched his troops into Caria, the Greeks invaded and plundered Phrygia.

Early in the ſpring, Ageſilaus gave out that his deſign was to invade Lydia; but Tiſſaphernes, who remembered the laſt year's ſtratagem, now taking it for granted that Ageſilaus would really invade Caria, made his troops again march to the defence of that province. But Ageſilaus now led his army into Lydia as he had given out, and approached Sardis; upon which Tiſſaphernes recalled his forces from their former rout, with a deſign to relieve the place. But Caria being a very mountainous country, and unfit for horſe, he had marched thither only with the foot, and left the horſe behind on the borders of that province. Whence, on their marching back to the relief of Sardis, the horſe being ſome days march before the foot, Ageſilaus took the advantage of ſo favourable an opportunity, and fell upon them before the foot could come to their aſſiſtance. The Perſians were routed at the very firſt onſet; after which Ageſilaus over-ran the whole country, enriching both himſelf and his army with the ſpoils of the conquered Perſians.

By this continued ill fortune Artaxerxes was ſo much provoked againſt Tiſſaphernes, that he ſoon after cauſed him to be put to death.

On the death of Tiſſaphernes, Tithrauſtes, who was appointed to ſucceed him, ſent large preſents to Ageſilaus, in hopes of perſuading him to abandon his conqueſts; but finding that commander was not by any means to be induced to relinquiſh the war, he ſent Timocrates of Rhodes into Greece, with large ſums of money to corrupt the leading men in the cities, and rekindle a war againſt the Lacedæmonians. This ſtratagem produced the intended effect; for the cities of Thebes, Argos, Corinth, and others, entering into a confederacy, obliged them to recall Ageſilaus to the defence of his own country.

31
Ageſilaus obliged to leave Aſia.

After the departure of Ageſilaus, which happened in the year 354 B. C. the Lacedæmonian power received a ſevere blow at Cnidos, where their fleet was entirely defeated by that of Artaxerxes under Conon, 50 of their ſhips being taken in the engagement; after which, Conon and Pharnabazus being maſters of the ſea, ſailed round the iſlands and coaſts of Aſia, taking the cities there which had been reduced by the Lacedæmonians. Saſtos and Abydos only held out, and reſiſted the utmoſt efforts of the enemy, tho' they had been beſieged both by ſea and land.

32
Lacedæmonians defeated.

Next year, Conon having aſſembled a powerful fleet, again took Pharnabazus on board, and reduced the iſland of Melos, from whence he made a deſcent on the coaſts of Lyconia, pillaging all the maritime provinces, and loading his fleet with an immenſe booty. After this, Conon obtained leave of him to repair to Athens with 80 ſhips and 50 talents, in order to rebuild the walls of that city; having firſt convinced Pharnabazus, that nothing could more effectually contribute to the weakening of the power of Sparta than putting Athens again in a condition to rival its power. He no ſooner arrived at Piræus the port of Athens, but he began to work; which, as he had a great number of hands, and was ſeconded by the zeal of all thoſe that were well inclined to the Athenians, was ſoon completed, and the city not only reſtored to its former ſplendour, but rendered more formidable than ever. The Lacedæmonians were now reduced to the neceſſity of accepting ſuch terms of peace as they could procure. The terms were, that all the Greek cities in Aſia ſhould be ſubject to the king of Perſia, as alſo the iſlands of Cyprus and Clazomena; that the iſlands of Scyros, Lemnos, and Imbros, ſhould be reſtored to the Athenians, and all the cities of Greece, whether ſmall or great, ſhould be declared free; and by the ſame treaty Artaxerxes engaged to join thoſe who accepted the terms he propoſed, and to aſſiſt them to the utmoſt of his power againſt ſuch as ſhould reject them.

33
Are obliged to make peace with the Perſians

34
Cyprus reduced.

Artaxerxes, being now diſengaged from the Grecian war, turned his arms againſt Evagoras king of Cyprus. This man was deſcended from the ancient kings of Salamine, the capital city of the iſland of Cyprus. His anceſtors had held that city for many ages in quality of ſovereigns; but were at laſt driven out by the Perſians, who, making themſelves maſters of the whole iſland, reduced it to a Perſian province. Evagoras, however, being a man of an enterpriſing genius, ſoon became weary of living in ſubjection to a foreign power, drove out the Perſian governor, and recovered his paternal kingdom. Artaxerxes attempted to drive him out of it; but, being diverted by the Greek war, was obliged to put off the enterpriſe. However, Conon, by means of Cteſias chief phyſician to Artaxerxes, got all differences accommodated, and Artaxerxes promiſed not to moleſt him in the poſſeſſion of his ſmall kingdom. But Evagoras ſoon becoming diſcontented with ſuch a narrow poſſeſſion, gradually reduced under his ſubjection almoſt the whole of the iſland. Some, however, there were who held out againſt him, and theſe immediately applied to Artaxerxes for aſſiſtance; and he, as ſoon as the war with Greece was at an end, bent all his force againſt Evagoras, intending to drive him quite out of the iſland. The Athenians, however, notwithſtanding the favours lately conferred upon them by the king of Perſia, could not forbear aſſiſting their old ally in ſuch a dreadful emergency. Accordingly, they ſent him ten men of war under the command of Philocrates; but the Lacedæmonian fleet, commanded by Talentias brother to Ageſilaus, falling in with them near the iſle of Rhodes, ſurrounded them ſo that not one ſhip could eſcape. The Athenians, determined to aſſiſt Evagoras at all events, ſent Chabrias with another fleet and a conſiderable body of land-forces; and with the aſſiſtance of theſe he quickly reduced the whole iſland. But in a ſhort time, the Athenians being obliged, in conſequence of the treaty concluded with the Perſians, to recall Chabrias, Artaxerxes attacked the iſland with an army of 300,000 men, and a fleet of 300 ſhips. Evagoras applied to the Egyptians, Libyans, Arabians, Tyrians, and other nations, from whom he received ſupplies both of men and money; fitting out a fleet with which he ventured an engagement with that of Artaxerxes. But being defeated, and obliged to ſhut himſelf up in Salamine, he was cloſely beſieged by ſea and land. Here at laſt he was obliged to capitulate, and abandon to the Perſians the whole of the iſland except Salamine, which he held as a king tributary to Artaxerxes.

35 Unſucceſsful expeditions againſt the Caduſians and Egyptians.

The Cyprian war being ended, Artaxerxes turned his arms againſt the Caduſians, whoſe country lay between the Euxine and Caſpian Seas. But theſe nations were too well accuſtomed to war to be overcome by the Perſians; and therefore the king was obliged to abandon the project, after having loſt a great number of his troops and all the horſes which he took out with him. In his Egyptian expedition, which happened immediately after the Caduſian war, he was attended with little better ſucceſs; which, however, was owing to the bad conduct of his general Pharnabazus. This commander being entruſted with the management of the Egyptian war, ſent an ambaſſador to Athens, complaining that Chabrias had engaged in the ſervice of an enemy of the king of Perſia, with whom the ſtate of Athens was in alliance, and threatening the republic with his maſter's reſentment if proper ſatisfaction was not given: at the ſame time he demanded Iphicrates, another Athenian, and the beſt general of his time, to command the Greek mercenaries in the Perſian ſervice. This the Athenians complied with; and Iphicrates having muſtered his troops, ſo exerciſed them in all the arts of war, that they became afterwards very famous among the Greeks under the name of *Iphicrateſian ſoldiers*. Indeed he had ſufficient time to inſtruct them; for the Perſians were ſo ſlow in their preparations, that two whole years elapſed before they were ready to take the field. At the ſame time Artaxerxes, that he might draw the more mercenaries out of Greece, ſent ambaſſadors to the different ſtates in it, declaring it to be his will and pleaſure that they ſhould live at peace with each other, on the terms of the treaty lately concluded: which declaration was received with pleaſure by all the ſtates except Thebes, who aſpired at the ſovereignty of Greece; and accordingly refuſed to conform to it. All things, however, at laſt being ready for the expedition, the troops were muſtered at the city then called *Ace*, and ſince *Ptolemais*; where they were found to conſiſt of 200,000 Perſians under the command of Pharnabazus, and 20,000 Greeks led by Iphicrates. The fleet conſiſted of 300 galleys, beſides a vaſt number of other veſſels which followed with proviſions. The fleet and army began to move at the ſame time; and that they might act in concert, they ſeparated as little as poſſible. It was propoſed, that the war ſhould begin with the ſiege of Peluſium; but Nectanebis, the revolted king of Egypt, had provided ſo well for the defence of the place, that it was thought expedient to drop the enterpriſe, and make a deſcent at one of the mouths of the Nile. In this they ſucceeded; for the Egyptians not expecting them at that place, had not taken ſuch care to fortify it as at Peluſium. The fortreſs of conſequence was eaſily taken, and all the Egyptians in it put to the ſword. After this, Iphicrates was for embarking the troops without loſs of time, and attacking Memphis the capital of Egypt. Had this opinion been followed before the Egyptians recovered from the conſternation into which they were thrown, it is highly probable that the whole country might have been reduced at once; but Pharnabazus would undertake nothing before the reſt of the forces were come up. Iphicrates then, in the utmoſt vexation at loſing ſo favourable an opportunity, preſſed Pharnabazus to allow him to attack the place with the Greek mercenaries only; but he refuſed this alſo, from a mean jealouſy of the honour which Iphicrates might acquire; and in the mean time the Egyptians recovered ſufficient courage to put themſelves in ſuch a poſture of defence that they could not be attacked with any probability of ſucceſs; and at the ſame time the Nile overflowing as uſual, obliged them to return to Phœnice. The expedition was again undertaken 12 years after, but without ſucceſs.

36 Ochus ſucceeds Artaxerxes.

The laſt years of the reign of Artaxerxes were greatly diſturbed by diſſenſions in his family; which at laſt broke his heart, and he died in the 94th year of his age, and 46th of his reign. He was ſucceeded by one of his ſons named *Ochus*, who behaved with ſuch cruelty, that almoſt one half of his dominions revolted as ſoon as he came to the throne. But, by reaſon of the diſſenſions of the rebels among themſelves, all of them were reduced, one after another; and among the reſt, the Sidonians, finding themſelves betrayed, burnt themſelves to the number of 40,000, together with their wives and children.

37 Reduces Egypt.

Ochus, having quelled all the inſurgents, immediately ſet himſelf about reducing Egypt, and for this purpoſe procured a reinforcement of other 10,000 mercenaries from Greece. On his march, he loſt a great number of his men drowned in the lake Serbonis, which lies between Phœnice and Egypt, extending about 30 miles in length. When the ſouth wind blows, the whole ſurface of this lake is covered with ſand, in ſuch a manner that no one can diſtinguiſh it from the firm land. Several parties of Ochus's army were loſt in it for want of proper guides; and it is ſaid that whole armies have ſometimes periſhed in the ſame place. When he arrived in Egypt, he detached three bodies to invade the country in different parts; each being commanded by a Perſian and a Greek general. The firſt was led by Lachares the Theban, and Roſaces governor of Lydia and Ionia; the ſecond by Nicoſtratus the Theban and Ariſtazanes; the third by Mentor the Rhodian and Bagoas an eunuch. The main body of the army he kept with himſelf, and encamped near Peluſium, with a deſign to watch the events of the war there. The event was ſucceſsful, as we have related under the article EGYPT; and Ochus having reduced the whole country, diſmantled their ſtrong-holds, plundered the temples, and returned to Babylon loaded with booty.

The king, having ended this war with ſuch ſucceſs, conferred very high rewards on his mercenaries and others who had diſtinguiſhed themſelves. To Mentor the Rhodian he gave 100 talents, and other preſents to a great value; appointing him alſo governor of all the coaſts of Aſia, and committing to his care the whole management of the war which he was ſtill carrying on againſt ſome provinces that had revolted in the beginning of his reign; and all theſe either by ſtratagems, or by force, he at laſt reduced; reſtoring the king's authority in all theſe places.—Ochus then, finding himſelf free from all troubles, gave his attention to nothing but his pleaſures, leaving the adminiſtration of affairs entirely to Bagoas the eunuch, and to Mentor. Theſe two agreed to ſhare the power between them; in conſequence of which the former had the provinces of Upper Aſia, and the latter all the reſt. Bagoas, being by birth an Egyptian, had a great zeal for the religion of his country, and endeavoured, on the conqueſt of Egypt, to influence the king in favour of the Egyptian ceremonies; but, in ſpite of all his endeavours, Ochus not only refuſed to comply, but killed the ſacred bull, the emblem of the Egyptian god Apis, plundered the temples, and carried away their ſacred records. This Bagoas ſuppoſed to be the higheſt guilt which a human creature could commit; and therefore poiſoned his maſter and benefactor in the 21ſt year of his reign. Nor did his revenge ſtop here; for he kept the king's body, cauſing another to be buried in its ſtead; and becauſe the king had cauſed his attendants eat the fleſh of Apis, Bagoas cut his body in pieces, and gave it ſo mangled to be devoured by cats, making handles for ſwords of his bones. He then placed Arſes the youngeſt of the deceaſed king's ſons on the throne, that he might the more eaſily preſerve the whole power to himſelf.

38 Ochus murdered by Bagoas.

Arſes did not long enjoy even the ſhadow of power which Bagoas allowed him, being murdered in the ſecond year of his reign by that treacherous eunuch, who now conferred the crown on Darius Codomannus, a diſtant relation of the royal family. Neither did he incline to let him enjoy the crown much longer than his predeceſſor; for, finding that he could not ſuffer himſelf to be guided by him in all things, the treacherous Bagoas brought him a poiſonous potion; but Darius got rid of him by his own artifice, cauſing him to drink the poiſon which he brought. This eſtabliſhed Darius in the throne as far as ſecurity from internal enemies could do ſo; but in a very little time his dominions were invaded, and, we may ſay, the ſame moment conquered by Alexander the Great. The particulars of that heroe's conqueſts are related under the article MACEDON; we ſhall therefore here only take notice of the fate of Darius himſelf, with which the Perſian empire concluded for many ages. After the battle of Arbela, which was deciſive in favour of Alexander, the latter took and plundered Perſepolis, from whence he marched into Media, in order to purſue Darius, who had fled to Ecbatan the capital of that province. This unhappy prince had ſtill an army of 30,000 foot, among whom were 4000 Greeks, who continued faithful to the laſt. Beſides, theſe he had 4000 ſlingers, and 3000 horſe, moſt of them Bactrians, and commanded by Beſſus governor of Bactria.—When Darius heard that Alexander was marched to Ecbatan, he retired into Bactria, with a deſign to raiſe another army; but ſoon after, changing his mind, he determined to venture a battle with the forces he ſtill had left. On this Beſſus governor of Bactria, and Nabarzanes a Perſian lord of great diſtinction, formed a conſpiracy againſt him, propoſing to ſeize his perſon, and, if Alexander purſued them, to gain his friendſhip and protection by betraying their maſter into his hands; but if they eſcaped, their deſign was to murder him and uſurp the crown. The troops were eaſily gained over, by repreſenting to them the deſperate ſituation of Darius's affairs; but Darius himſelf, though informed of their proceedings, and ſolicited to truſt his perſon among the Greeks, refuſed to give credit to the report, or follow ſuch a ſalutary counſel. The conſequence of this was, that he was in a few days ſeized by the traitors; who, out of reſpect to the royal dignity, bound him with golden chains, and ſhutting him up in a covered cart, fled with him towards Bactria. The cart was covered with ſkins, and ſtrangers appointed to drive it, without knowing who the priſoner was. Beſſus was proclaimed commander in chief in the room of Darius by the Bactrian horſe; but Artabazus and his ſons, with the forces they commanded, and the Greeks, under the command of one *Patron*, retired from the body of the army under Beſſus, and marched over the mountains towards Parthiene. In the mean time Alexander arriving at Ecbatan, was informed that Darius had left the place five days before. He then diſpatched orders to Clitus, who had fallen ſick at Suſa, to repair, as ſoon as he recovered, to Ecbatan, and from thence to follow him into Parthia with the cavalry and 6000 Macedonians who were left in Ecbatan. Alexander himſelf with the reſt of the army purſued Darius; and the 11th day arrived at *Rhages*, having marched in that ſpace of time 3300 furlongs. Moſt of thoſe who accompanied him died through the fatigue of ſo long a march; inſomuch that, on his arrival at Rhages, he could ſcarce muſter 60 horſemen. Finding that he could not come up with Darius, who had already paſſed the Caſpian ſtraits, he ſtaid five days at Rhages, in order to refreſh his army and ſettle the affairs of Media. From thence he marched into Parthia, and encamped at a ſmall diſtance from the Caſpian ſtraits, which he paſſed the next day without oppoſition. He had ſcarce entered Parthia, when he was informed that Beſſus and Nabarzanes had conſpired againſt Darius, and deſigned to ſeize him. Hereupon, leaving the main body of the army behind with Craterus, he

39 Darius Codomannus.

40 Perſia conquered by Alexander the Great.

41 Darius ſeized by his own ſubjects.

advanced with a ſmall troop of horſe lightly armed; and having marched day and night without ever halting, except for a few hours, he came on the third day to a village where Beſſus with his Bactrians had encamped the day before. Here he underſtood that Darius had been ſeized by the traitors; that Beſſus had cauſed him to be ſhut up in a cloſe cart, which he had ſent before, that he might be the more ſure of his perſon; and that the whole army except Artabazus and the Greeks, who had taken another rout, obeyed Beſſus. Alexander therefore taking with him a ſmall body of light-armed horſe, for the others could not poſſibly proceed further, at laſt came in ſight of the barbarians, who were marching in great confuſion. His unexpected appearance ſtruck them, though far ſuperior in number, with ſuch terror, that they immediately betook themſelves to flight; and becauſe Darius refuſed to follow them, Beſſus and thoſe who were about him diſcharged their darts at the unfortunate prince, leaving him wallowing in his blood.

41
And murdered.

After this they all fled different ways, and were purſued with great ſlaughter by the Macedonians. In the mean time the horſes that drew the cart in which Darius was, ſtopping of their own accord, for the drivers had been killed by Beſſus, near a village about four furlongs from the highway. Thither Polyſtratus a Macedonian, being preſſed with thirſt in the purſuit of the enemy, was directed by the inhabitants to a fountain to refreſh himſelf, not far from the place where they ſtopped. As he was filling his helmet with water he heard the groans of a dying man; and looking round him, diſcovered a cart with a team of horſes, unable to move by reaſon of the many wounds they had received. When he drew near he perceived Darius lying in the cart, and very near his end, having ſeveral darts ſticking in his body. However, he had ſtrength enough left to call for ſome water, which Polyſtratus readily brought him. Darius, after drinking, turned to the Macedonian, and with a faint voice told him, that, in the deplorable ſtate to which he was reduced, it was no ſmall comfort to him that his laſt words would not be loſt: he then charged him to return his hearty thanks to Alexander for the kindneſs he had ſhewn to his wife and family, and to acquaint him, that, with his laſt breath, he beſought the gods to proſper him in all his undertakings, and make him ſole monarch of the univerſe. He added, that it did not ſo much concern him as Alexander to purſue and bring to condign puniſhment thoſe traitors who had treated their lawful ſovereign with ſuch cruelty, that being the common cauſe of all crowned heads. Then, taking Polyſtratus by the hand, "Give Alexander your hand, ſays he, as I give you mine, and carry him, in my name, the only pledge I am able to give, in this condition, of my gratitude and affection." Having uttered theſe words, he expired in the arms of Polyſtratus. Alexander coming up a few minutes after, bewailed his death, and cauſed his body to be interred with the higheſt honours.

43
His murderers puniſhed.

The traitor Beſſus being at laſt reduced to extreme difficulties, was delivered up by his own men naked and bound into the hands of the Macedonians; on which Alexander gave him up to Oxathres the brother of Durius, to ſuffer what puniſhment he ſhould think proper. Plutarch tells us that he was executed in the following manner: Several trees being by main force bent down to the ground, and one of the traitor's limbs tied to each of them, the trees, as they were ſuffered to return to their natural poſition, flew back with ſuch violence, that each carried with it the limb that was tied to it.

44
Revolt of the Parthians.

Thus ended the empire of Perſia, 209 years after it had been founded by Cyrus. After the death of Alexander the Perſian dominions became ſubject to Seleucus Nicator, and continued ſubject to him for 62 years, when the Parthians revolted, and conquered the greateſt part of them. To the Parthians they continued ſubject for 475 years; when the ſovereignty was again reſtored to the Perſians, as related under the article PARTHIA.

45
Perſian empire reſtored by Artaxares.

The reſtorer of the Perſian monarchy was Artaxerxes, or Artaxares, who was not only a private perſon, but of ſpurious birth. However, he poſſeſſed great abilities, by which means he executed his ambitious projects. He was no ſooner ſeated on the throne than he took the pompous title of *king of kings*, and formed a deſign of reſtoring the empire to its ancient glory. He therefore gave notice to the Roman governors of the provinces bordering on his dominions, that he had a juſt right, as the ſucceſſor of Cyrus, to all the Leſſer Aſia; which he therefore commanded them immediately to quit, as well as the provinces on the frontiers of the ancient Parthian kingdom, which were already his. The conſequence of this was a war with Alexander Severus the Roman emperor. Concerning the event of this war there are very different accounts. It is certain, however, that, on account of his exploits againſt Artaxares, Alexander took the titles of *Parthicus* and *Perſicus*; though, it would ſeem, with no great reaſon, as the Perſian monarch loſt none of his dominions, and his ſucceſſors were equally ready with himſelf to invade the Roman territories.

46
Succeeded by Sapores who takes Valerian the Roman emperor priſoner.

Artaxares dying after a reign of 12 or 15 years, was ſucceeded by his ſon Sapores; a prince of great abilities both of body and mind, but fierce, haughty, untractable, and cruel. He was no ſooner ſeated on the throne than he began a new war with the Romans. In the beginning he was unſucceſsful; being obliged, by the young emperor Gordian, to withdraw from the Roman dominions, and was even invaded in his turn; but, in a ſhort time, Gordian being murdered by Philip, the new emperor made peace with him upon terms very advantageous to the Perſians. He was no ſooner gone than Sapor renewed his incurſions, and made ſuch alarming progreſs, that the emperor Valerian, at the age of 70, marched againſt him in perſon with a numerous army. An engagement enſued, in which the Romans were defeated and Valerian taken priſoner. Sapor purſued his advantages with ſuch inſolence of cruelty, that the people of the provinces took arms, firſt under Calliſtus a Roman general, and then under Odenatus prince of Palmyrene. Thus they not only protected themſelves from the inſults of the Perſians, but even gained many great victories over them, and drove Sapor with diſgrace into his own dominions. In his march he is ſaid to have made uſe of the bodies of his unfortunate priſoners to fill up the hollow roads, and to facilitate the paſſage of his carriages over ſuch rivers as lay in his way. On his return to Perſia, he was ſolicited by the kings of the Caduſians, Armenians, Bactrians, and other nations, to ſet Valerian at liberty; but

47 and treats him cruelly.

but to no purpoſe. On the contrary, he uſed him the worſe; treated him daily with indignities, ſet his foot upon his neck when he mounted his horſe, and, as is affirmed by ſome, flayed him alive after ſome years confinement; and cauſed his ſkin to be tanned, which he kept as a monument of his victory over the Romans. This extreme inſolence and cruelty was followed by an uninterrupted courſe of miſfortune. Odenatus defeated him in every engagement, and even ſeemed ready to overthrow his empire; and after him Aurelian took ample vengeance for the captivity of Valerian. Sapor died in the year of Chriſt 273, after having reigned 31 years; and was ſucceeded by his ſon Hormiſdas, and he by Varanes I. Concerning both theſe princes we know nothing more than that the former reigned a year and ten days, and the latter three years; after which he left the crown to Varanes II. who ſeems to have been ſo much awed by the power of the Romans, that he durſt undertake nothing. The reſt of the Perſian hiſtory, to the overthrow of the empire by the Saracens, affords nothing but an account of their continued invaſions of the Roman empire, which more properly belongs to the hiſtory of ROME; and to which therefore we refer.

48 The Perſian empire overthrown by the Saracens.

The laſt of the Perſian monarchs of the line of Artaxares, was Iſdigertes, or Jezdegerd, as he is called by the Arabian and Perſian hiſtorians, who was cotemporary with Omar the ſecond caliph after Mahomet. He was ſcarce ſeated on the throne, when he found himſelf attacked by a powerful army of Saracens under the command of one Sad, who invaded the country through Chaldea. The Perſian general took all imaginable pains to harraſs the Arabs on their march; and having an army ſuperior to them in numbers, employed them continually in ſkirmiſhes; which were ſometimes favourable to him, and ſometimes otherwiſe. But Sad, perceiving that this lingering war would deſtroy his army, determined to haſten forward, and force the enemy to a general engagement. The Perſians declined this for a long time; but at length, finding a convenient plain where all their forces might act, they drew up in order of battle, and reſolved to wait for the Arabs. Sad having diſpoſed his men in the beſt order he could, attacked the Perſians with the utmoſt fury. The battle laſted three days and three nights; the Perſians retiring continually from one poſt to another, till at laſt they were entirely defeated; and thus the capital city, and the greateſt part of the dominions of Perſia, fell into the hands of the Arabs. The conquerors ſeized the treaſures of the kings; which were ſo vaſt, that, according to a Mahometan tradition, their prophet gave the Saracen army a miraculous view of thoſe treaſures before the engagement, in order to encourage them to fight.

After the loſs of this battle, Jezdegerd retired into Choraſſan, where he maintained himſelf as king, having under his ſubjection two other provinces, named *Kerman* and *Segeſtan*. But after he had reigned in this limited manner for 19 years, one of the governors of the few towns he had left betrayed it, and called in the Turks. This place was called *Merou*, ſeated on the river Gihon or Odus. Jezdegerd immediately marched againſt the rebels and their allies. The Perſians were defeated; and the unfortunate monarch, having with much difficulty reached the river, found there a little boat, and a fiſherman to whom it belonged. The king offered him a bracelet of precious ſtones; but the fellow, equally brutal and ſtupid, told him that his fare was five farthings, and that he would neither take more nor leſs. While they diſputed, a party of the rebel horſe came up, and knowing Jezgederd, killed him in the year 652.

Jezdegerd left behind him a ſon named *Firouz*, and a daughter named *Dara*. The latter eſpouſed Boſtenay, whom the rabbinical writers have dignified with the title of the *head of the captivity;* and who, in fact, was the prince of the Jews ſettled in Chaldea. As for Firouz, he ſtill preſerved a little principality; and when he died, left a daughter named *Mah Afrid*, who married Walid the ſon of the caliph Abdalmalek, by whom ſhe had a ſon named *Yezid*, who became caliph, and conſequently ſovereign of Perſia; and ſo far was this prince from thinking himſelf above claiming the title derived from his mother, that he conſtantly ſtyled himſelf the *ſon of Khoſrou king of Perſia, the deſcendant of the caliph Maroan, and among whoſe anceſtors on the ſide of the mother were the Roman emperor and the khacan.*

49 State of Perſia under the Mogul princes.

Perſia continued to be ſubject to the Arabs till the decline of the Saracen empire, when it was ſeized by various uſurpers, till the time of Jenghiz Khan, who conquered it as well as almoſt all the reſt of Aſia. After his death, which happened in the year 1227, Perſia, together with the neighbouring countries, were governed by officers appointed by his ſucceſſors, who reigned at Kærakorom, in the eaſtern parts of Tartary, till the year 1253, when it became once more the ſeat of a mighty empire under Hulaku the Mogul, who in 1256 aboliſhed the caliphat, by taking the city of BAGDAD, as related under that article. After the death of Hulaku, his ſon Abaka ſucceeded to his extenſive dominions; and his firſt care was to ſhut up all the avenues of his empire againſt the other princes of the race of Jenghiz Khan, who reigned in different parts of Tartary. His precautions, however, were of little avail; for, in the very beginning of his reign, he was invaded by Barkan Khan, of the race of Jagatay the ſon of Jenghiz Khan, from Great Bukharia, with an army of 300,000 men. Abaka was but indifferently prepared to oppoſe ſuch a formidable power; but, happily for him, his antagoniſt died before the armies came to an engagement, upon which the invaders diſperſed and returned to Tartary. In the year 1264, Armenia and Anatolia were ravaged by the Mamlucks from Egypt, but were obliged to fly from Abaka; who thus ſeemed to be eſtabliſhed in the poſſeſſion of an empire almoſt as extenſive as that of the ancient Perſian kings. His tranquillity, however, was of ſhort duration; for, in 1268, his dominions were invaded by Borak Khan, a prince likewiſe of the race of Jagatay, with an army of 100,000 men. He quickly reduced the province of Choraſſan, where he met with little oppoſition, and, in 1269, advanced as far as Aderbijan, where Abaka had the bulk of his forces. A bloody battle enſued; in which Abaka was victorious, and Borak obliged to fly into Tartary, with the loſs of all his baggage and great part of his army. Abaka died in 1282, after a reign of 17 years, not without ſuſpicion of being poiſoned; and was ſucceeded by his brother Ahmed Khan. He was the firſt of the family of Jenghiz Khan who embraced Mahometaniſm; but neither he nor his ſucceſſors appear to have been in the leaſt verſed in the arts of government; for the Perſian hiſtory, from this period, becomes only an account of inſurrections, murders, rebellions, and poiſonings, till the year 1335, when it ſplit all to pieces, and was poſſeſſed by a great number of petty princes; all of whom were at perpetual war with each other till the time of Timur Beg, or Tamerlane, who once more reduced them all under one juriſdiction.

50
Under Tamerlane and his ſucceſſors.

After the death of Tamerlane, Perſia continued to be governed by his ſon Shah Rukh, a wiſe and valiant prince; but, immediately after his death, fell into the ſame confuſion as before; being held by a great number of petty tyrants, till the beginning of the 16th century, when it was conquered by Shah Iſmael Safi, or Sefi; of whoſe family we have the following account. His father was Sheykh Hayder or Haydr, the ſon of Soltan Juneyd, the ſon of Sheykh Ibrahim, the ſon of Sheykh Ali, the ſon of Sheykh Muſa, the ſon of Sheykh Sefi, who was the 13th in a direct line from Ali the ſon-in-law of the prophet Mahomet. When Tamerlane returned from the defeat of Bajazet the Turkiſh ſultan, he carried with him a great number of captives out of Karamania and Anatolia, all of whom he intended to put to death on ſome remarkable occaſion; and with this reſolution he entered Ardebil, or Ardevil, a city of Aderbijan, about 25 miles to the eaſt of Taurus, where he continued for ſome days. At this time lived in that city the Sheykh Safi or Sefi abovementioned, reputed by the inhabitants to be a ſaint; and, as ſuch, much reverenced by them. The fame of Safi's ſanctity ſo much moved Tamerlane, that he paid him frequent viſits; and, when he was about to depart, promiſed to grant whatever favour he ſhould aſk. Sheykh Safi, who had been informed of Tamerlane's deſign to put the captives to death, requeſted of the conqueror that he would ſpare the lives of thoſe unfortunate men. Tamerlane, deſirous of obliging him, not only granted this requeſt, but delivered them up to him to be diſpoſed of as he thought fit; upon which the Sheykh furniſhed them with cloaths and other neceſſaries as well as he could, and ſent them home to their reſpective countries. This generous action proved very beneficial to the family; for the people were ſo much affected with ſuch an extraordinary inſtance of virtue, that they repaired in great numbers to Safi, bringing with them conſiderable preſents; and this ſo frequently, that few days paſſed in which he was not viſited by many. Thus the deſcendants of the Sheykh made a conſpicuous figure till the year 1486, when they were all deſtroyed by the Turkmans except Iſmael, who fled to Ghilan, where he lived under the protection of the king of that country; after which he became conſpicuous on the following occaſion.

51
Conquered by Iſmael Sofi.

There was at that time, among the Mahometans, a vaſt number of people diſperſed over Aſia; and among theſe a particular party who followed that of Haydr the father of Iſmael, which Sheyk Safi, one of his anceſtors, had brought into great reputation. Iſmael, who had aſſumed the ſurname of *Sofi*, or *Sage*, finding that Perſia was all in confuſion, and hearing that there was a great number of the Hayderian ſect in Karamania, removed thither. There he collected 7000 of his party, all devoted to the intereſt of his family; and while he was yet only 14 years of age, conquered Shirwan. After this he purſued his conqueſts; and as his antagoniſts never united to oppoſe him, had conquered the greateſt part of Perſia, and reduced the city of Bagdad by the year 1510. However, his conqueſts on the weſt ſide were ſoon ſtopped by the Turks; for, in 1511, he received a great defeat from Salem I. who took Tauris; and would probably have cruſhed the empire of Iſmael in its infancy, had he not thought the conqueſt of Egypt more important than that of Perſia. After his defeat by Selim, Iſmael never undertook any thing of conſequence. He died in 1523, leaving the crown to his eldeſt ſon Tahmaſp I.

The new Shah was a man of very limited abilities, and was therefore invaded by the Turks almoſt inſtantly on his acceſſion to the throne. However, they were obliged to retreat by an inundation, which overflowed their camp, and which frightened them with its red colour, probably ariſing from the nature of the ſoil over which it paſſed. Thamaſp, however, reduced Georgia to a province of the Perſian empire; that country being in his time divided among a number of petty princes, who, by reaſon of their diviſions, were able to make little oppoſition.

52
Reign of Shah Abbas the Great.

The reigns of the ſucceeding princes afford nothing remarkable till the time of Shah Abbas I. ſurnamed the *Great*. He aſcended the throne in the year 1584; and his firſt care was to recover from the Turks and Tartars the large provinces they had ſeized which formerly belonged to the Perſian empire. He began with declaring war againſt the latter, who had ſeized the fineſt part of Choraſſan. Accordingly, having raiſed a powerful army, he entered that province, where he was met by Abdallah Khan the chief of the Uſbeck Tartars. The two armies lay in ſight of each other for ſix months; but at length Abbas attacked and defeated his enemies, forcing them, for that time, to abandon Choraſſan. Here he continued for three years; and on his leaving that place, fixed the ſeat of government at Iſpahan, where it has continued ever ſince. His next expedition was againſt the Turks. Underſtanding that the garriſon of Tauris were in no expectation of an enemy, he formed a deſign of ſurpriſing the place; and, having privately aſſembled a few forces, he marched with ſuch celerity, that he reached a paſs called *Shibli*, very near Tauris, in ſix days, tho' it is uſually 18 or 20 days journey for the caravans. Here the Turks had poſted a few ſoldiers, rather for the purpoſe of collecting the cuſtoms on ſuch commodities as were brought that way, than of defending the paſs againſt an enemy. Before they came in ſight of this paſs, Abbas and ſome of his officers left the reſt of the army, and rode briſkly up to the turnpike. Here the ſecretary of the cuſtom-houſe, taking them for merchants, demanded the uſual duties. Abbas replied, that the perſon who had the purſe was behind, but at the ſame time ordered ſome money to be given him. But while the ſecretary was counting it, he was ſuddenly ſtabbed by the Shah's order; and the officers who were with him ſuddenly falling upon the few ſoldiers who were there, obliged them to ſubmit; after which he entered the paſs with his army. The governor of Tauris marched out with all the troops he could collect on ſo ſhort a warning; but being inferior to the Perſians, he was utterly defeated, and himſelf taken priſoner; after which the city was obliged to ſubmit, Perſia.

ſubmit, as alſo a number of places in the neighbourhood. One city only, called *Orumi*, being very ſtrongly ſituated, reſiſted all the efforts of Abbas; but was at laſt taken by the aſſiſtance of the Curds, whom he gained over by promiſing to ſhare the plunder of the place with them. But inſtead of this, he formed a deſign to cut them all off at once; fearing that they might at another time do the Turks a ſervice of the ſame nature that they had done to him juſt now. For this reaſon he invited their chiefs to dine with him; and having brought them to a tent, the entrance to which had ſeveral turnings; and on the inſide were ſtationed two executioners, who cut off the heads of the gueſts as ſoon as they entered.

After this Shah Abbas conſiderably enlarged his dominions, and repelled two dangerous invaſions of the Turks. He attempted alſo to promote commerce, and civiliſe his ſubjects; but ſtained all his great actions by his abominable cruelties, which he practiſed on every one who gave him the leaſt cauſe of offence; nay, frequently without any cauſe at all. He took the Iſle of Ormus from the Portugueſe, who had kept it ſince 1507, by the aſſiſtance of ſome Engliſh ſhips in 1622; and died ſix years after, aged 70.

53 iſtory of houli han.

The princes who ſucceeded Shah Abbas the Great, were remarkable only for their cruelties and debaucheries, which occaſioned a revolution in 1716, when the Shah Huſſeyn was dethroned by the Afghans, a people inhabiting the country between Perſia and India; who being oppreſſed by the miniſters, revolted under the conduct of one Mereweis. The princes of the Afghan race continued to enjoy the ſovereignty for no more than 16 years, when Aſhraff the reigning Shah was dethroned by one of his officers. On this Tahamaſp, otherwiſe called *Prince Thamas*, the only ſurvivor of the family of Abbas, aſſembling an army, invited into his ſervice Nadir Khan, who had obtained great reputation for his valour and conduct. He was the ſon of a Perſian nobleman, on the frontiers of Uſbeck Tartary; and his uncle, who was his guardian, keeping him out of poſſeſſion of the caſtle and eſtate, which was his inheritance, he took to robbing the caravans; and, having increaſed his followers to upwards of 500 men, became the terror of that part of the country, and eſpecially of his uncle, who had ſeized his eſtate. His uncle therefore reſolved to make his peace with him, and with that view invited him to the caſtle, where he entertained him in a ſplendid manner; but Nadir Khan ordered his throat to be cut next night, and all his people to be turned out of the caſtle. No ſooner had Nadir Khan got the command of the Perſian army, than he attacked and defeated the uſurper Eſriff, put him to death, and recovered all the places the Turks and Ruſſians had made themſelves maſters of during the rebellion; and then prince Thamas ſeemed to be eſtabliſhed on the throne: but Nadir Khan, to whom Thamas had given the name of *Thamas Kouli Khan*, that is, *the Slave of Thamas*, thinking his ſervices not ſufficiently rewarded, and pretending that the king had a deſign againſt his life, or at leaſt to ſet him aſide, conſpired againſt his ſovereign, and put him to death, as is ſuppoſed: after which, he uſurped the throne, ſtyling himſelf *Shah Nadir*, or *King Nadir*.

He afterwards laid ſiege to Candahor, of which a ſon of Mereweis had poſſeſſed himſelf. While he lay at this ſiege, the court of the Great Mogul being diſtracted with factions, one of the parties invited Shah Nadir to come to their aſſiſtance, and betrayed the Mogul into his hands. He thereupon marched to Delhi, the capital of India, and ſummoned all the viceroys and governors of provinces to attend him, and bring with them all the treaſures they could raiſe, and thoſe that did not bring as much as he expected, he tortured and put to death. Having thus amaſſed the greateſt treaſure that ever prince was maſter of, he returned to Perſia, giving the Mogul his liberty, on condition of his reſigning the provinces on the weſt ſide of the Indus to the crown of Perſia. He afterwards made a conqueſt of Uſbeck Tartary, and plundered Bochara the capital city. Then he marched againſt the Dagiſtan Tartars; but loſt great part of his army in their mountains, without fighting. He defeated the Turks in ſeveral engagements; but laying ſiege to Bagdad, was twice compelled to raiſe the ſiege. He proceeded to change the religion of Perſia to that of Omar, hanged up the chief prieſts, put his own ſon to death, and was guilty of ſuch cruelty, that he was at length aſſaſſinated by his own relations, anno 1747. A conteſt upon this enſued between theſe relations for the crown; which continued for ſeveral years, and made Perſia a dreadful ſcene of confuſion, bloodſhed, and devaſtation: but at laſt fortune declared in favour of Kerim Khan, who was crowned in the month of October 1763, at Tauris.

54 Air and climate of Perſia.

As to the air and climate of this country, conſidering the great extent thereof, it cannot but be very different, according to the ſituation of its ſeveral parts; ſome being frozen with cold, whilſt others are burnt with heat at the ſame time of the year. The air, wherever it is cold, is dry; but, where it is extremely hot, it is ſometimes moiſt. All along the coaſt of the Perſian Gulph, from weſt to eaſt, to the very mouth of the river Indus, the heat for four months is ſo exceſſive, that even thoſe who are born in the country, unable to bear it, are forced to quit their houſes, and retire to the mountains; ſo that ſuch as travel in theſe parts, at that ſeaſon, find none in the villages but wretched poor creatures, left there to watch the effects of the rich, at the expence of their own health. The extreme heat of the air, as it is inſupportable, ſo it makes it prodigiouſly unwholeſome; ſtrangers frequently falling ſick there, and ſeldom eſcaping. The eaſtern provinces of Perſia, from the river Indus to the borders of Tartary, are ſubject to great heats, though not quite ſo unwholeſome as on the coaſts of the Indian Ocean and the Perſian Gulph; but in the northern provinces, on the coaſt of the Caſpian Sea, the heat is full as great, and, though attended with moiſture, as unwholeſome as on the coaſt before mentioned. From October to May, there is no country in the world more pleaſant than this; but the people carry indelible marks of the malign influence of their ſummers, looking all of them of a faint yellow, and having neither ſtrength nor ſpirits; though, about the end of April, they abandon their houſes, and retire to the mountains, which are 25 or 30 leagues from the ſea. But this moiſtneſs in the air is only in theſe parts: the reſt of Perſia enjoys a dry air, the ſky being perfectly ſerene, and hardly ſo much as a cloud ſeen to fly therein.

Perſia. in. Though it ſeldom rains, it does not follow that the heat admits of no mitigation; for in the night, notwithſtanding there is not a cloud to be ſeen, and the ſky is ſo clear, that the ſtars alone afford a light ſufficient to travel by, a briſk wind ſprings up, which laſts until within an hour of the morning, and gives ſuch a coolneſs to the air, that a man can diſpenſe with a tolerable warm garment. The ſeaſons in general, and particularly in the middle of this kingdom, happen thus: the winter, beginning in November, and laſting until March, is very ſharp and rude, attended with froſt and ſnow; which laſt deſcends in great flakes on the mountains, but never in the plains. There are mountains, three days journey to the weſt of Spauhawn, or Iſpahan, on which the ſnow lies for eight months in the year. From the month of March to that of May there are briſk winds; from May to September the air is ſerene and dry, refreſhed by pleaſant gales, which blow in the night, at evening and morning; and in September and November the wind blows as in the ſpring. The great drineſs of the air exemps Perſia from thunder and earthquakes. In the ſpring, indeed, there ſometimes falls hail; and, as the harveſt is then pretty far advanced, it does a great deal of miſchief. The rainbow is ſeldom ſeen in this country, becauſe there riſe not vapours ſufficient to form it; but in the night there are ſeen rays of light ſhooting thro' the firmament, and followed as it were by a train of ſmoke. The winds, however briſk, ſeldom ſwell into ſtorms or tempeſts; but, on the other hand, they are ſometimes poiſonous and infectious on the ſhore of the Gulph, as all travellers agree. Mr Tavernier ſays, that at Gombroon people often find themſelves ſtruck by a ſouth wind, in ſuch a manner that they cry, "I burn:" and immediately fall down dead. M. le Brun tells us, that he was aſſured while he was there, that the weather was ſometimes ſo exceſſively ſultry as to melt the ſeals of letters. At this time the people go in their ſhirts, and are continually ſprinkled with cold water; and ſome even lie ſeveral hours naked in the water. Among the inconveniencies conſequent from this malign diſpoſition of the air, one of the moſt terrible is the engendering, in the arms and legs, a kind of long ſmall worms, which cannot be extracted without great danger of breaking them; upon which a mortification enſues.

55 Soil. The ſoil of Perſia is in general ſtony, ſandy, barren, and every where ſo dry, that, if it be not watered, it produces nothing, not even graſs; but, where they can turn the water into their plains and valleys, it is not unfruitful. There is a great difference in point of fertility, in the different provinces of the empire; and thoſe of Media, Iberia, Hyrcania, and Bactria, are now, in a great meaſure, what they were formerly, and ſurpaſs moſt of the others in their productions. All along the Perſian Gulph, the ſoil is ſtill more barren, cattle leſs plenty, and every thing in a worſe condition than any where elſe.

56 Produce, &c. Though there is ſcarce a province in Perſia which does not produce wine, yet the wine of ſome provinces is much more eſteemed than that of others; but Schiras wine is univerſally allowed to be the very beſt in Perſia: inſomuch, that it is a common proverb there, That to live happily one muſt eat the bread of Yezd, and drink the wine of Schiras.

Perſia. The grain moſt common in Perſia is wheat; which is wonderfully fair and clean. As for barley, rice, and millet, they only make bread of them in ſome places, as in Courdeſtan, when their wheat-bread is exhauſted before the return of harveſt. They do not cultivate in this country either oats or rye; except where the Armenians are ſettled, who make great uſe of the latter in Lent. Rice is the univerſal aliment of all ſorts of people in Perſia; for this reaſon they are extremely careful in its cultivation; for, after they have ſown it in the ſame manner as other grain, they in three months time tranſplant it, root by root, into fields, which are well watered, otherwiſe it would never attain that perfection in which we find it there; ſince it is ſofter, ſooner boiled, and more delicious, than the ſame grain in any other part of the world. Perhaps its taſte is, in ſome meaſure, heightened by a practice they make uſe of to give it a gloſſy whiteneſs, *viz.* by cleanſing it, after it is beaten out of the huſks, with a mixture of flour and ſalt. Corn ripens exceedingly in this country; ſo that in ſome parts they have a threefold crop in the year. The Perſian bread is generally very thin, white, and good; and commonly cheap enough.

Metals of all ſorts have been found in Perſia. Since the reign of Shah Abbas the Great, iron, copper, and lead, have been very common; but there are no gold or ſilver mines open at preſent; though, as Perſia is a very mountainous country, ſuch might very probably be found, if pains were taken to ſearch them out. There are ſilver mines in Kirman and Mazanderan, and one not far from Spauhawn; but they cannot be worked for want of wood. Minerals are alſo found in Perſia in abundance; eſpecially ſulphur, ſaltpetre, ſalt, and alum. Nothing is more common in this country than to meet with plains, ſometimes 10 leagues in length, covered entirely with ſalt, and others with ſulphur or alum. In ſome places ſalt is dug out of mines, and even uſed in building houſes. Marble, free-ſtone, and ſlate, are found in great plenty about Hammadan. The marble is of four colours, *viz.* white, black, red and black, and white and black. Perſia yields two ſorts of petroleum, or napthe; namely, black and white. In the neighbourhood of Tauris they find azure; but it is not ſo good as that brought from Tartary. Among the moſt valuable productions of Perſia, are the precious ſtones called *turquoiſes*, of which there are ſeveral rocks or mines.

The horſes of Perſia are the moſt beautiful of the Eaſt, though they are not ſo much eſteemed as thoſe of Arabia; ſo great, however, is the demand for them, that the fineſt ones will fetch from 90l. to 450l. ſterling. They are higher than the Engliſh ſaddle-horſes; ſtreight before, with a ſmall head, legs wonderfully ſlender, and finely proportioned; they are mighty gentle, good travellers, very light and ſprightly, and do good ſervice till they are 18 or 20 years old. The great numbers of them ſold into Turkey and the Indies, though none can be carried out of the kingdom without ſpecial licence from the king, is what makes them ſo dear. Next to horſes, we may reckon mules, which are much eſteemed here, and are very fine: and next to theſe we may juſtly place aſſes, of which they have in this country two ſorts; the firſt bred in Perſia, heavy and doltiſh, as aſſes in other countries are; the other originally of an Arabian breed, the moſt docile and uſeful creature of its kind in the world. They are uſed wholly for the ſaddle; being remarkable for their eaſy manner of going, and are very ſure-footed, carrying their heads lofty, and moving gracefully. Some of them are valued at 20l. ſterling. The mules here are alſo very fine; they pace well, never fall, and are ſeldom tired. The higheſt price of a mule is about 45l. ſterling. Camels are alſo numerous in Perſia, and very ſerviceable: they call them *kechty-krouch-konion*, i. e. the "ſhips of the land;" becauſe the inland trade is carried on by them, as the foreign is by ſhips. Of theſe camels there are two ſorts, the northern and ſouthern: the latter, which is much the ſmaller, but ſwifter, will carry a load of about 700 weight, and trot as faſt as a horſe will gallop; the other will travel with a load of 1200 or 1300 weight: both are profitable to their maſters, as coſting little or nothing to keep. They travel without halter or reins; grazing on the road from time to time, notwithſtanding their load. They are managed entirely by the voice; thoſe who direct them making uſe of a kind of ſong, and the camel moving briſker, or at its ordinary pace, as they keep a quicker or ſlower time. The camels ſhed their hair ſo clean in the ſpring, that they look like ſcalded ſwine; but then they are pitched over, to keep the flies from ſtinging them. The camels hair is the moſt profitable fleece of all the tame beaſts: fine ſtuffs are made of it; and in Europe, hats, with a mixture of a little beaver.

As beef is little eaten in Perſia, their oxen are generally employed in ploughing, and other ſorts of labour. Hogs are nowhere bred in Perſia, if we except a province or two on the borders of the Caſpian Sea. Sheep and deer are very common throughout all Perſia.

Of wild beaſts, the number is not great in that country, becauſe there are few foreſts; but where there are any, as in Hyrcania, now called *Tabriſtan*, abundance of lions, bears, tigers, leopards, porcupines, wild boars, and wolves, are to be found; but the laſt are not ſo numerous as any of the other ſpecies.

There are but few inſects in this country; which may be aſcribed to the drineſs of the climate. In ſome provinces, however, there is an infinite number of locuſts or graſhoppers, which fly about in ſuch clouds as to darken the air. In certain parts of the Perſian dominions they have large black ſcorpions, ſo venomous, that ſuch as are ſtung by them die in a few hours. In others, they have lizards, frightfully ugly, which are an ell long, and as thick as a large toad, their ſkins being as hard and tough as that of the ſea-dog: they are ſaid to attack and kill men ſometimes; but that may be doubted. The ſouthern provinces are infeſted with gnats; ſome with long legs, like thoſe we call *midges;* and ſome white, and as ſmall as fleas, which make no buzzing, but ſting ſuddenly, and ſo ſmartly, that the ſting is like the prick of a needle. Among the reptiles is a long ſquare worm, called by the inhabitants *hazar-pey*, *i. e.* "thouſand-feet," becauſe its whole body is covered with feet: it runs prodigiouſly faſt; and its bite is dangerous, and even mortal, if it gets into the ear.

There are in Perſia all the ſeveral ſorts of fowls which we have in Europe, but not in ſuch great plenty; excepting, however, wild and tame pigeons, of which vaſt numbers are kept all over the kingdom, chiefly on account of their dung; which is the beſt manure for melons. It is a great diverſion among the lower ſort of people in town and country to catch pigeons, tho' it be forbidden: for this purpoſe they have pigeons ſo taught, that flying in one flock, they ſurround ſuch wild ones as they find in the field, and bring them back with them to their maſters. The partridges of this country are the largeſt and fineſt in the world, being generally of the ſize of our fowls. Geeſe, ducks, cranes, herons, and many other ſorts of water-fowl, are common here; as are likewiſe nightingales, which are heard all the year, but chiefly in the ſpring; martlets, which learn whatever words are taught them; and a bird called *noura*, which chatters inceſſantly, and repeats whatever it hears. Of birds of a larger ſize, the moſt remarkable is the pelican, by the Perſians called *tacab*, *i. e.* "water-carrier;" and alſo *miſc*, *i. e.* "ſheep;" becauſe it is as large as one of thoſe animals*. There are in Perſia various birds of prey. Some of their falcons are the largeſt and fineſt in the world: the people take great pains to teach them to fly at game; the Perſian lords being great lovers of falconry, and the king having generally 800 of theſe ſort of birds, each of which has a perſon to attend it.

57
Mountains, rivers, and ſeas.

There is perhaps no country in the world which, generally ſpeaking, is more mountainous than Perſia; but many of them yield neither ſprings nor metals, and but few of them are ſhaded with trees. It is true, ſome of the chief of them are ſituated on the frontiers, and ſerve as a kind of natural ramparts, or bulwarks, to this vaſt empire. Among the latter are the mountains of Caucaſus and Ararat, ſometimes called the *mountains of Dagheſtan;* which fill all the ſpace between the Euxine and Caſpian Seas: thoſe called *Taurus*, and the ſeveral branches thereof, run through Perſia from Natolia to India, and fill all the middle of the country.

As to rivers, except the Araxes, which riſes in the mountains of Armenia, and falls into the Kur or Cyrus before it reaches the Caſpian Sea, there is not one navigable ſtream in this country. The Oxus divides Perſia on the north-eaſt, from Uſbeck Tartary. The Indus alſo may now be reckoned among the rivers of Perſia, as the provinces lying to the weſt of that river are now in poſſeſſion of that crown: this river is ſaid to run a courſe of more than 1000 miles, and overflows all the low grounds in April, May, and June.

The ſeas on the ſouth of Perſia are, the Gulph of Perſia or Baſſora, the Gulph of Ormus, and the Indian Ocean. The only ſea on the north is the Caſpian, or Hyrcanian ſea; which is more properly a lake, having no communication with any other ſea. Theſe ſeas, together with the lakes and rivers, ſupply Perſia with plenty of fiſh. The Caſpian ſea contains very fine fiſh on one ſide; and the Perſian Gulph on the other, is believed to have more fiſh than any other ſea in the world. On the coaſts of this gulph is taken a ſort of fiſh, for which they have no particular name: its fleſh is of a red colour, very delicious, and ſome of them weigh 200 or 300 pounds. The river-fiſh are chiefly barbels; but far from being good. Thoſe of the lakes are carps and ſhads. In the river at Spauhawn are a great number of crabs, which crawl up the trees, and live night and day under the leaves, whence they are taken; and are eſteemed very delicious food.

---

* See *Pelicanus.*

58 Trade. The Engliſh, and other nations, trade with the Perſians ſeveral ways, particularly by the Gulph of Ormus at Gombroon, and by the way of Turkey. A trade alſo was not many years ſince opened by the Engliſh with Perſia through Ruſſia and the Caſpian Sea ; but that is now diſcontinued, having been prohibited by the court of Ruſſia, who were apprehenſive that the Engliſh would teach the Perſians to build ſhips, and diſpute the navigation of the Caſpian Sea with them. The principal commodities and manufactures of Perſia are, raw and wrought ſilks, mohair, camblets, carpets, leather; for which, and ſome others, the European merchants exchange chiefly woollen manufactures; but the trade is carried on altogether in European ſhipping, the Perſians having ſcarce any ſhips of their own, and the Ruſſians the ſole navigation of the Caſpian Sea. There is not a richer or more profitable trade in the world, than that which is carried on between Gombroon and Surat in the Eaſt Indies ; and the Engliſh Eaſt India company frequently let out their ſhips to tranſport the merchandiſe of the Banians and Armenians from Perſia to India. The civil wars which deſolated this country, and put a ſtop to all trade, after the death of Shah Nadir, ſeem to have been over ſeveral years, Kerim Khan, one of the competitors, having gained ſuch a ſuperiority in the year 1763 over his rivals, that he was crowned king; ſince which time peace and tranquillity ſeem to have taken place of anarchy and confuſion. The Shah, or ſovereign of Perſia, is the chief merchant; and he uſually employs his Armenian ſubjects to traffic for him in every part of the world. The king's agents muſt have the refuſal of all merchandiſe, before his ſubjects are permitted to trade. It is computed that Perſia produces yearly upwards of 22,000 bales of ſilk, chiefly in the provinces of Ghilan and Mazanderan, each bale weighing 263 pounds. Vaſt quantities of Perſian ſilk uſed to be imported into Europe, eſpecially by the Dutch, Engliſh, and Ruſſians, before the civil wars began. The goods exported from Perſia to India are, tobacco, all ſorts of fruits, pickled and preſerved, eſpecially dates, marmalade, wines, diſtilled waters, horſes, Perſian feathers, and Turkey leather of all ſorts and colours, a great quantity whereof is alſo exported to Muſcovy and other European countries. The exports to Turkey are, tobacco, galls, thread, goats hair, ſtuffs, mats, box-work, and many other things. As there are no poſts in the eaſt, and trading by commiſſion, with the uſe of bills of exchange, is little known, traffic muſt proceed in a very aukward heavy manner, in compariſon of that of Europe.

59 Money. The moſt current money of Perſia are the abaſſees, worth about 1 s. 4d. Sterling, they are of the fineſt ſilver. An abaſſee is worth two mahmoudes ; a mahmoude, two ſhahees ; and a ſhahee, ten ſingle or five double caſbeghes : theſe laſt pieces are of braſs, the others of ſilver ; for gold is not current in trade. The ſhahees are not very common ; but mahmoudes and caſbeghes are current every where. Horſes, camels, houſes, &c. are generally ſold by the toman, which is an imaginary coin, worth 200 ſhahees, or 50 abaſſees; and they uſually reckon their eſtates that way. Such a one, they ſay, is worth ſo many tomans, as we ſay pounds in England.

60 Government. Perſia is an abſolute monarchy, the lives and eſtates of the people being entirely at the diſpoſal of their prince. The king has no council eſtabliſhed, but is adviſed by ſuch miniſters as are moſt in favour; and the reſolutions taken among the women of the haram frequently defeat the beſt laid deſigns. The crown is hereditary, excluding only the females. The ſons of a daughter are allowed to inherit. The laws of Perſia exclude the blind from the throne; which is the reaſon that the reigning prince uſually orders the eyes of all the males of the royal family, of whom he has any jealouſy, to be put out. The king has generally a great many wives, which it would be death for any one, beſides the eunuchs, who have the ſuperintendance of them, to look at, or even ſee by accident; wherefore, when he travels, notice is given to all men to quit the road, nay their very houſes, and to retire to a great diſtance.

The prime miniſter is called *attemaet doulet*, which ſignifies the director of the empire, and alſo *vizir azem*, or the great ſupporter of the empire ; as he alone almoſt ſuſtains the whole weight of the adminiſtration. This miniſter's chief ſtudy is to pleaſe his maſter, to ſecure to himſelf an aſcendant over his mind, and to avoid whatever may give him any uneaſineſs or umbrage. With this view, he never fails to flatter him, to extol him above all the princes upon earth, and to throw a thick veil over every thing that might help to open his eyes, or diſcover to him the weakneſs of the ſtate. He even takes particular care to keep the king in utter ignorance, to hide from him, or at leaſt to ſoften, all unwelcome news; and, above all, to exalt immoderately every the leaſt advantage he obtains over his enemies. As he takes theſe methods, which indeed are and muſt be taken, more or leſs, by the miniſters of every deſpotic prince, to ſecure the favour and confidence of his maſter ; ſo the inferior officers and governors of provinces are obliged to employ all the means in their power to ſecure the prime miniſters, they depending no leſs upon him than he does upon the king. There is a gradation of deſpotiſm and ſlavery, down from the prime miniſter to the loweſt retainer to the court, or dependent on the government. Children are ſometimes, in Perſia, required by the king to cut off the ears and noſe, and even to cut the throats, of their parents ; and theſe orders cannot be objected to, without endangering their own lives. Indeed, their baſeneſs and mercenarineſs are ſuch, that they will perpetrate ſuch atrocious deeds without the leaſt ſcruple or difficulty, when they have a promiſe or expectation of poſſeſſing their poſts. The prime miniſters, notwithſtanding the precarious footing on which they ſtand, in effect of their abilities or good fortune, ſometimes continue in their employments during life, or, if removed, are only baniſhed to ſome city, where they are allowed to ſpend the remainder of their days in a private ſtation.

Next to the prime miniſter are the na-dir, or grandmaſter of the houſehold ; the mehter, or groom of the chambers, who is always a white eunuch ; the mir-akbor-baſhe, or maſter of the horſe ; the mir-ſhikar-baſhe, or great huntſman and falconer ; the divan-beggi, or chief juſtice, to whom there lies an appeal from the deroga, or the lieutenant of police, in every town ; the vacka-nuviez, or recorder of events, or firſt ſecretary of ſtate ; the muſſau-ſhe-elmenaleck, or maſter of the accounts and finances of the kingdom; the numes-humbaſhes, or the king's chief phyſicians; the ſhickada-ſibaſhe, or inſpector of the palace, and regulator of rank at court; and the khans, or governors of provinces, under whom are other governors, called *ſoltans*, appointed alſo by the king.

The chief miniſters, in ſpirituals, are the zedder, or grand-pontiff, anſwering to the mufti among the Turks; under him are the ſheik-el, ſelom, and cadi, who decide in all matters of religion, and make all contracts, teſtaments, and other public deeds, being appointed by the king in all the principal towns; and next to theſe are the pichnamas, or directors of the prayers; and the moullahs, or doctors of the law.

There is no nobility in Perſia, or any reſpect ſhewn to a man on account of his family, except to thoſe who are of the blood of their great prophet or patriarchs; but every man is eſteemed according to the poſt he poſſeſſes; and when he is diſmiſſed he loſes his honour, and he is no longer diſtinguiſhed from the vulgar.

With reſpect to the forces of Perſia, their two bodies, called the *Kortſhies* and *Goulans*, that ſerve on horſeback, are well kept and paid, and may amount, the former to about 22,000, and the latter to about 18,000. The kortſhies are deſcended from an ancient but foreign race; and the goulans are either Georgian renegadoes or ſlaves, or the children of ſlaves of all nations. The infantry, called *Tangtchies*, are picked out from among the moſt robuſt and vigorous of the peaſants, and compoſe a body of 40,000 or 50,000. The Perſians have few fortified towns, and had no ſhips of war till Kouli Khan built a royal navy, and among them had a man of war of 80 guns; but ſince the death of that uſurper, we hear no more of their fleet.

The arms of the king of Perſia are a lion couchant, looking at the ſun as he riſes over his back. His uſual title is *Shah* or *Patſhaw*, the "diſpoſer of kingdoms." They add alſo to the king's titles thoſe of *ſultan*, and *chan* or *cham*, which is the title of the Tartar ſovereigns. To acts of ſtate the Perſian monarch does not ſubſcribe his name; but the grant runs in this manner, *viz. This act, or edict, is given by him whom the univerſe obeys.*

As to the manners of the ancient Perſians, we know little of them; excepting that they were exceedingly voluptuous and effeminate. After the conqueſt of the empire by Alexander, the Greek diſcipline and martial ſpirit being in part communicated to them, they became much more formidable; and hence the Parthians were found to be a match, not only for the Syro-Macedonian princes, but even for the Romans. Of their manners we know little or nothing, but that to their valour and military ſkill they joined in a ſurpriſing degree all the luxury and diſſipation of the ancient Perſians.

The modern Perſians, like the Turks, plundering all the adjacent nations for beauties to breed by, are men of a good ſtature, ſhape, and complection; but the Gaures, or ancient Perſians, are homely, ill-ſhaped, and clumſy, with a rough ſkin, and olive complections. In ſome provinces, not only the complections but the conſtitutions of the inhabitants, ſuffer greatly by the extreme heat and unwholeſomeneſs of the air. The Perſian women, too, are generally handſome and well-ſhaped, but much inferior to thoſe of Georgia and Circaſſia. The men wear large turbans on their heads, ſome of them very rich, interwoven with gold and ſilver; a veſt, girt with a ſaſh; and over it a looſe garment, ſomething ſhorter; with ſandals, or ſlippers, on their feet. When they ride, which they do every day, if it be but to a houſe in the ſame town, they wear pliant boots of yellow leather; the furniture of their horſes is extremely rich, and the ſtirrups generally of ſilver: whether on horſeback or on foot, they wear a broad ſword and a dagger in their ſaſh. The dreſs of the women does not differ much from that of the men; only their veſts are longer, and they wear ſtiffened caps on their heads, and their hair down.

Their uſual drink is water and ſherbet, as in other Mahometan countries, wine being prohibited; but the officers and ſoldiers frequently break through theſe reſtraints, and drink wine, which is made by the Armenians and Gaures in Schiras and other Perſian provinces; and none of them make any ſcruple of intoxicating themſelves with opium, of which any of them will eat as much as would poiſon half a dozen Chriſtians.

The Perſians excel more in poetry than any other ſort of literature; and aſtrologers are now in as great reputation in Perſia as the magi were formerly. Their books are all manuſcripts, the art of printing having not yet been introduced among them: they excel indeed in writing, and have eight different hands. They write from the right hand to the left, as the Arabs do. In their ſhort-hand, they uſe the letters of the alphabet; and the ſame letters, differently pointed, will have 20 different ſignifications. In ſhort, the Perſians are born with as good natural parts as any people in the Eaſt, but make a bad uſe of them; being great diſſemblers, cheats, liars, and flatterers, and having a ſtrong propenſity to voluptuouſneſs, luxury, idleneſs, and indolence; vices, indeed, to which the Aſiatics in general are much addicted.

PERSIAN WHEEL. See HYDROSTATICS.

PERSICA, the PEACH, is by Linnæus referred to the ſame claſs and genus with amygdalus; however, as they are ſo commonly reckoned to be different genera, we have thought proper to diſtinguiſh them. There are a great variety of peach-trees planted in the gardens, ſome of which are preſerved only for the beauty of their flowers, but moſt of them for the ſake of the fruit. Of thoſe remarkable for the beauty of their flowers the principal are, 1. The vulgaris, or common peach-tree, with double flowers, which is a very great ornament in gardens, producing very large double flowers of a beautiful red or purple colour, and grows to a conſiderable ſize. 2. The humilis, or dwarf-almond. 3. The africana, or double-flowering dwarf-almond. Theſe two reach not above the height of three or four feet, though their flowers are of equal beauty with the former.

Of the peach-trees cultivated for the ſake of their fruit there are a great number, to deſcribe which particularly would exceed the proper bounds of this article. They are raiſed from the ſtones of the fruit, which ſhould be planted in autumn on a bed of light dry earth, about three inches deep and four inches aſunder. In the winter the beds ſhould be covered with mulch to protect them from the froſt. In this bed they ſhould remain for a year; when they are to be taken up and planted in a nurſery, where they are to remain one or two years; after which they muſt be removed to the places where they are to continue.

PERSICANA, in botany. See POLYGONUM.

PERSIUS (Flaccus Aulus), a Latin poet in the reign of Nero, celebrated for his ſatires. He was born, according to ſome, at Volterra in Tuſcany; and according to others, at Tigulia, in the gulf Della Specia, in the year 34. He was educated till 12 years old at Valterro; and afterwards continued his ſtudies at Rome under Palæmon the grammarian, Virginius the rhetorician, and Cornutus the Stoic philoſopher, who contracted a friendſhip for him. Perſius conſulted that illuſtrious friend in the compoſition of his verſes. Lucian alſo ſtudied with him under Cornutus; and appeared ſo charmed with his verſes, that he was inceſſantly breaking out into acclamations at the beautiful paſſages in his ſatires: an example rarely ſeen in poets of equal rank. He was a ſteady friend, a good ſon, an affectionate brother and parent. He was chaſte, meek, and modeſt: which ſhews how wrong it is to judge of a man's morals by his writings; for the ſatires of Perſius are not only licentious, but ſharp and full of bitterneſs. He wrote but ſeldom; and it was ſome time before he applied himſelf regularly to it.

Perſius was of a weak conſtitution, and troubled with a bad ſtomach; of which he died in the 30th year of his age. Six of his ſatires remain; in their judgments of which the critics have been much divided, excepting as to their obſcurity, Perſius being indeed the moſt obſcure of all the Latin poets. As a poet, he is certainly inferior to Horace and Juvenal; and all the labours of Iſaac Caſaubon, who has written a moſt learned and elaborate commentary upon him, cannot make him equal to either of them as a ſatiriſt, though in virtue and learning he exceeded them both. He was a profeſſed imitator of Horace; yet had little of Horace's wit, eaſe, and talent at ridicule. His ſtyle is grand, figurative, poetical, and ſuitable to the dignity of the Stoic philoſophy: and hence he ſhines moſt in recommending virtue and integrity: here it is that ſatire becomes him. He was too grave to court the muſes with ſucceſs: but he had a great ſoul, ſuſceptible of noble ſentiments, which give a grace but to indifferent poetry. His cotemporaries thought highly of him. Quintilian allows, that Perſius, although he wrote but one book of ſatires, acquired a great deal of true glory, *Multum et veræ gloriæ quamvis uno libro Perſius meruit*: and Martial ſays much the ſame thing, *Sæpius in libro memoratur Perſius uno*, &c.

PERSON, an individual ſubſtance of a rational intelligent nature. Thus we ſay, an ambaſſador repreſents the perſon of his prince; and that, in law, the father and ſon are reputed the ſame perſon.

PERSON, in grammar, a term applied to ſuch nouns or pronouns as, being either prefixed or underſtood, are the nominatives in all inflections of a verb; or it is the agent or patient in all finite or perſonal verbs. See GRAMMAR.

PERSONAL, any thing that concerns, or is reſtrained to, the perſon: thus it is a maxim in ethics, that all faults are perſonal.

PERSONAL *Action*, in law, is an action levied directly and ſolely againſt the perſon; in oppoſition to a real or mixed action. See ACTION.

PERSONAL *Goods*, or *Chattels*, in law, ſignifies any moveable thing belonging to a perſon, whether alive or dead. See CHATTELS.

PERSONAL *Verb*, in grammar, a verb conjugated in all the three perſons: thus called in oppoſition to an imperſonal verb, or that which has the third perſon only.

PERSONALITY, in the ſchools, that which conſtitutes an individual a diſtinct perſon.

PESONATÆ, the name of the 40th order in Linnæus's Fragments of a Natural Method, conſiſting of a number of plants whoſe flowers are furniſhed with an irregular gaping or grinning petal, which, in figure, ſomewhat reſembles the ſnout of an animal. The bulk of the genera of this natural order arrange themſelves under the claſs and order didynamia angioſpermia of the Sexual Method.

The reſt, although they cannot enter into the artificial claſs juſt mentioned, for want of the claſſic character, the inequality of the ſtamina; yet, in a natural method, which admits of greater latitude, may be arranged with thoſe plants, which they reſemble in their habit and general appearance, and particularly in the circumſtance expreſſed in that title.

PERSONIFYING, or PERSONALIZING, the giving an inanimate being the figure, ſentiments, and language of a perſon.

Perſonifying is eſſential to poetry, eſpecially to the epopœia: the poets have therefore perſonified all the paſſions, and even repreſented them as deities; as, the goddeſs Perſuaſion, the god Sleep; the Furies, Envy, Diſcord; and Fame, Fortune, Victory, Sin, Death, &c.

PERSPECTIVE.

PERSPECTIVE teaches how to repreſent objects on a plane ſuperficies, ſuch as they would appear at a certain diſtance and height, upon a tranſparent plane perpendicular to the horizon, placed between the objects and the eye.

It was in the 16th century that *Perſpective* was revived, or rather re-invented. It owes its birth to painting, and particularly to that branch of it which was employed in the decorations of the theatre, where landſcapes were properly introduced, and which would have looked unnatural and horrid if the ſize of the objects had not been pretty nearly proportioned to their diſtance from the eye. We learn from Vitruvius, that Agatharchus, inſtructed by Æſchylus, was the firſt who wrote upon this ſubject; and that afterwards the principles of this art were more diſtinctly taught by Democritus and Anaxagoras, the diſciples of Agatharchus. Of the theory of this art, as deſcribed by them, we know nothing; ſince none of their writings have eſcaped the general wreck that

was

Plate CCXXXVI.

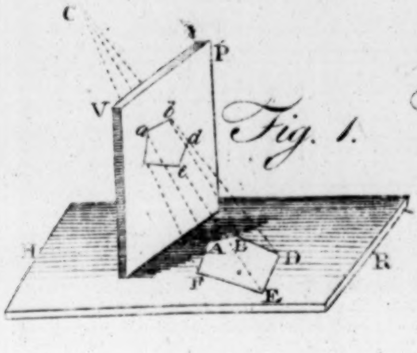


Fig. 1.

C
P
V
b
a
d
c
H
A
B
D
R
F
E

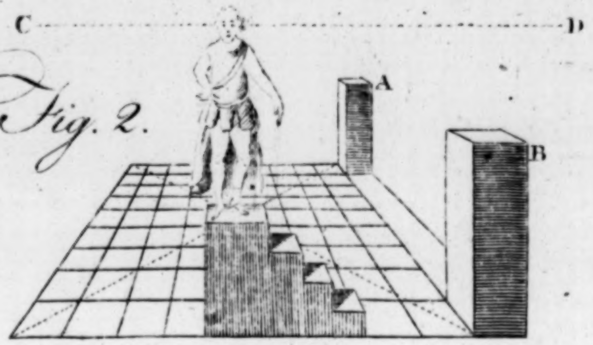


Fig. 2.

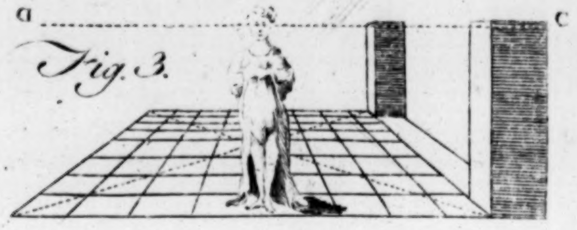


Fig. 3.

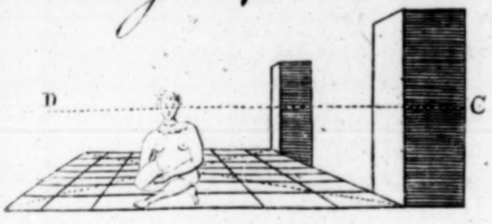


Fig. 4.

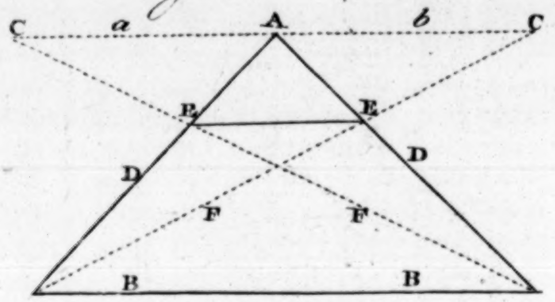


Fig. 5.

C
a
A
b
C
E
E
D
D
F
F
B
B

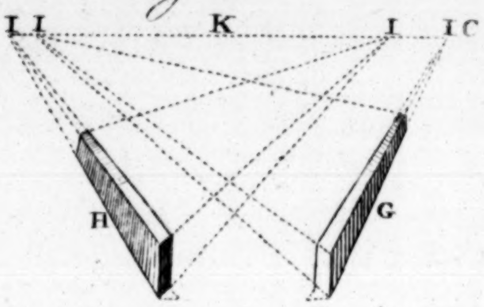


Fig. 6.

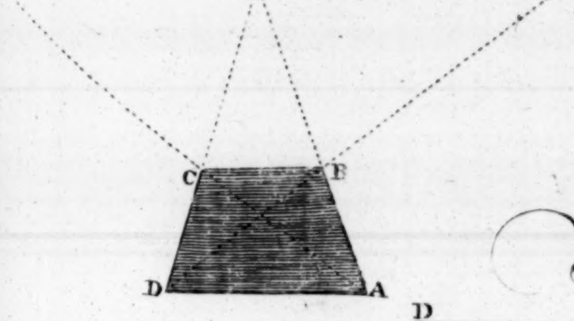


Fig. 7.

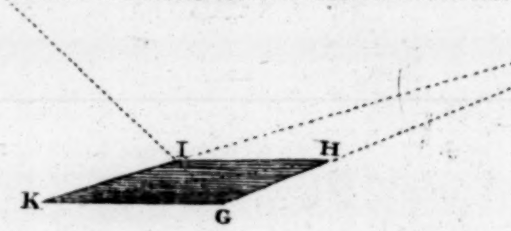


Fig. 8.

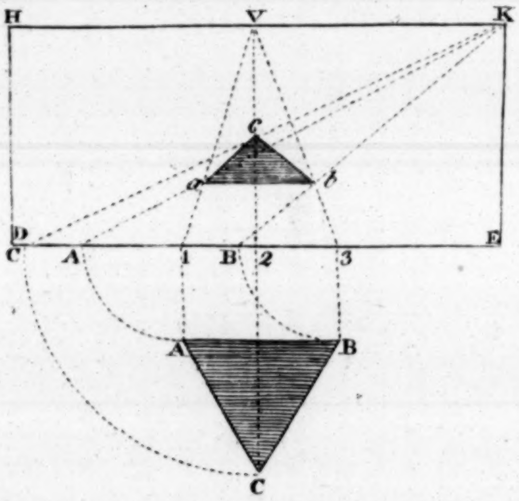


Fig. 9.

H
V
K
c
a
b
D
C
A
1
B
2
3
E
A
B
C

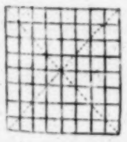


Fig. 10.

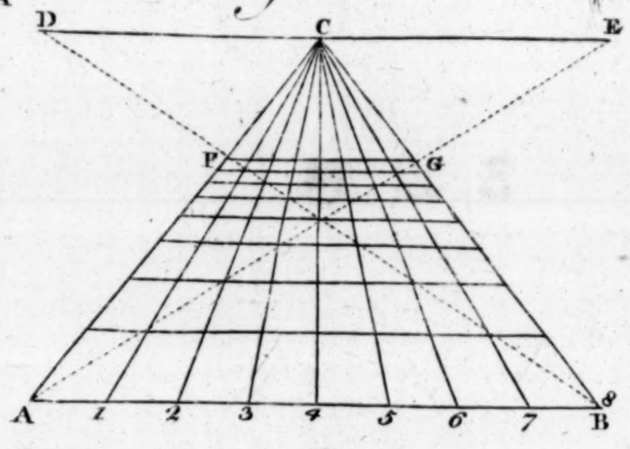


Fig. 11.

D
C
E
F
G
A
1
2
3
4
5
6
7
8
B

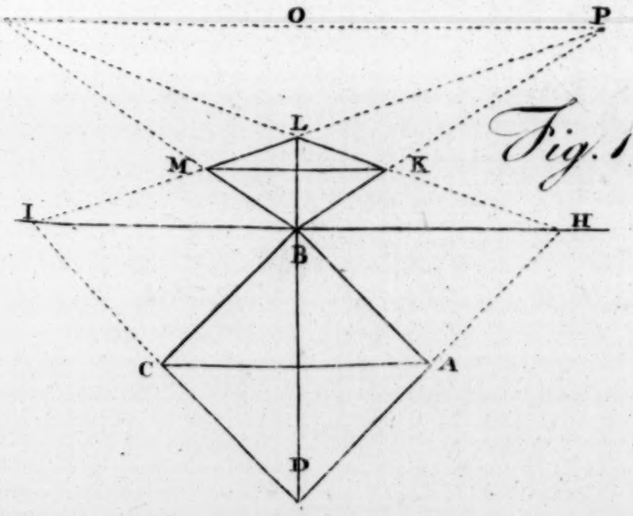


Fig. 12.

O
P
L
M
K
I
H
B
C
A
D

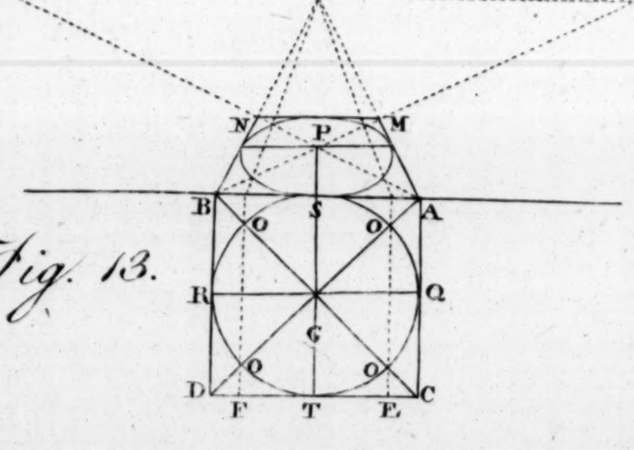


Fig. 13.

K
H
I
N
P
M
B
O
S
O
A
R
Q
G
O
O
D
F
T
E
C

3 MA 53

was made of ancient literature in the dark ages of Europe. However, the revival of painting in Italy was accompanied with a revival of this art.

The firſt perſon who attempted to lay down the rules of perſpective was Pietro del Borgo, an Italian. He ſuppoſed objects to be placed beyond a tranſparent tablet, and endeavoured to trace the images which rays of light, emitted from them, would make upon it. But we do not know what ſucceſs he had in this attempt, becauſe the book which he wrote upon this ſubject is not now extant. It is, however, very much commended by the famous Egnazio Dante; and, upon the principles of Borgo, Albert Durer conſtructed a machine, by which he could trace the perſpective appearance of objects.

Balthazar Peruſſi ſtudied the writings of Borgo, and endeavoured to make them more intelligible. To him we owe the diſcovery of points of diſtance, to which all lines that make an angle of 45 degrees with the ground-line are drawn. A little time after, Guido Ubaldi, another Italian, found that all the lines that are parallel to one another, if they be inclined to the ground-line, converge to ſome point in the horinzontal line; and that through this point alſo, a line drawn from the eye, parallel to them, will paſs. Theſe principles put together enabled him to make out a pretty complete theory of perſpective.

Great improvements were made in the rules of perſpective by ſubſequent geometricians; particularly by profeſſor Graveſende, and ſtill more by Dr Brook Taylor, whoſe principles are, in a great meaſure new, and far more general than any before him.

Plate CXXXVI

In order to underſtand this ſubject, a general knowledge of the principles of Optics is abſolutely neceſſary. The foundation of perſpective may be underſtood, by ſuppoſing the pentagon ABDEF (fig. 1.) were to be repreſented by the rules of perſpective on the tranſparent plane VP, placed perpendicularly on the horizontal plane HR; dotted lines are imagined to paſs from the eye C to each point of the pentagon, as CA, CB, CD, &c. which are ſuppoſed, in their paſſage through the plane, PV to leave their traces or veſtigia in the points *a*, *b*, *d*, &c. on the plane, and thereby to delineate the pentagon *a b d e f*; which, as it ſtrikes the eye by the ſame rays that the original pentagon ABDEF does, will be a true perſpective repreſentation of it.

The buſineſs of perſpective, therefore, is to lay down geometrical rules for finding the points *a*, *b*, *d*, *e*, *f*, upon the plane; and hence alſo we have a mechanical method of delineating any object very accurately.

Perſpective is either employed in repreſenting the ichnographies or ground-plots of objects: or the ſcenographies, or repreſentations of the objects themſelves.

But before we give any examples of either, it will be proper to explain ſome technical terms in regard to perſpective in general: and firſt, the horizontal line is that ſuppoſed to be drawn parallel to the horizon through the eye of the ſpectator; or rather it is a line which ſeparates the heaven from the earth, and which limits the ſight. Thus, A, B, (*ibid.* fig. 2.) are two pillars below the horizontal line CD, by reaſon the line is elevated above them; in fig. 3. they are ſaid to be equal with it, and in fig. 4. raiſed above it. Thus, according to the different points in view, the objects will be either higher or lower than the horizontal line. The point of ſight A (*ibid.* fig. 5.) is that which makes the centrical ray on the horizontal line *a b*: or, it is the point where all the other viſual rays, DD, unite. The points of diſtance C, C, are points ſet off in the horizontal line at equal diſtances on each ſide of the point of ſight A; and in the ſame figure BB repreſents the baſe line, or fundamental line: EE is the abridgment of the ſquare; of which D, D, are the ſides; F, F, the diagonal lines, which go to the points of diſtance C, C. Accidental points are thoſe where the objects end: theſe may be caſt negligently; becauſe neither drawn to the point or ſight, nor to thoſe of diſtance, but meeting each other in the horizontal line. For example, two pieces of ſquare timber G and H (*ibid.* fig. 6.) make the points I, I, I, I, on the horizontal line: but go not to the point of ſight K, nor to the points of diſtance C, C; theſe accidental points ſerve likewiſe for caſements, doors, windows, tables, chairs, &c. The point of direct view, or of the front, is when we have the object directly before us; in which caſe it ſhews only the foreſide; and, if below the horizon, a little of the top; but nothing of the ſides, unleſs the object be polygonous.

Thus the plane ABCD, (*ibid.* fig. 7.) is all in front; and if it were raiſed we ſhould not ſee any thing of the ſides AB or CD, but only the front AD: the reaſon is, that the point of view E being directly oppoſite thereto, cauſes a diminution on each ſide; which, however, is only to be underſtood where an elevation is the object; for if it be a plan, it ſhews the whole, as ABCD.

The point of oblique view, is when we ſee an object aſide of us, and as it were aſlant, or with the corner of the eye: the eye, however, being all the while oppoſite to the point of ſight; in which caſe, we ſee the object laterally, and it preſents to us two ſides or faces.

For inſtance, if the point of ſight be in F, (*ibid.* fig. 8.) the object GHIK will appear athwart, and ſhew two faces GK and GH; in which caſe it will be a ſide point.

We ſhall now give ſome examples, by which it will appear, that the whole practice of perſpective is built upon the foundation already laid down. Thus, to find the perſpective appearance of a triangle ABC (*ibid* fig. 9.) between the eye and the triangle draw the line DE, which is called the *fundamental line*; from 2 draw 2 V, repreſenting the perpendicular diſtance of the eye above the fundamental line, be it what it will; and through V draw, at right angles to 2 V, HK parallel to DE: then will the plane DHKE repreſent the tranſparent plane on which the perſpective repreſentation is to be made. Next, to find the perſpective points of the angles of the triangle, let fall perpendiculars A 1, C 2, B 3. from the angles to the fundamental DE: ſet off theſe perpendiculars upon the fundamental oppoſite to the point of diſtance K, to B, A, C; from 1, 2, 3, draw lines to the principal point V; and from the points A, B, and C, on the fundamental line, draw the right lines AK, BK, CK, to the point of diſtance K; which is ſo called, becauſe the ſpectator ought to be ſo far removed from the figure or painting, as it is diſtant from the principal point V. The points *a*, *b*, and *c*, where the viſual lines V 1, V 2, V 3, interſect the lines of diſtance AK, BK, CK, will be the angular points of the angle *a b c*, the true repreſentation of ABC.

To draw a Square Pavement in Perſpective.

Plate CXXXVI. fig. 10.

SUPPOSE your piece of pavement to conſiſt of 64 pieces of marble, each a foot ſquare. Your firſt buſineſs is, to draw an ichnographical plan or ground-plot of it, which is thus performed. Having made an exact ſquare of the ſize you intend your plan, divide the baſe and horizon into eight equal parts; and from every diviſion in the baſe to its oppoſite point in the horizon, rule perpendicular lines: then divide the ſides into the ſame number, ruling parallel lines acroſs from point to point: ſo will your pavement be divided into 64 ſquare feet; becauſe the eight feet in length, multiplied by the ſame in breadth, give the number of ſquare feet or pieces of marble contained in the whole: then rule diagonals from corner to corner; and thus will your ground-plot appear as in fig 10.

Fig. 11.

Now, to lay this in perſpective, draw another ſquare to your intended ſize, and divide the baſe line AB into eight equal parts, as before; then fix your point of ſight C in the middle of the horizon DE, and from the ſame point rule lines to every diviſion in the baſe AB; after which, rule diagonal lines from D to B, and from E to A, anſwerable to thoſe in the ground-plot, and your ſquare will be reduced to the triangle ABC; then from the point F, where the diagonal DB interſects the line AC, to the oppoſite interſection G, where the diagonal EA croſſes the line CB, rule a parallel line, which is the abridgment of the ſquare. Then, through the points where the diagonals croſs the reſt of the lines which go from the baſe to the point of ſight, rule parallel lines, and your ſquare pavement will be laid in perſpective, as in fig. 11.

Fig. 12.

To diminiſh a Square viewed by the Angle D, *fig.* 12.

HAVING deſcribed the plane ABCD, draw a line to touch or raiſe the angle B, and falling perpendicularly on BD.

This being continued as a baſe line, lay your ruler on the ſide of the ſquare AD and DC, and where the ruler cuts the terreſtrial line make the points H, I.

Then from H and B draw lines to the point of diſtance P, and from I draw a line to the other point of diſtance G; and in the interſection of thoſe lines, make points, which will give you the ſquare KLMB.

To do without the plan: ſet off the diameter each way from the middle point B, as to H and I. But in either caſe no line is to be drawn to the point of ſight O.

To diminiſh a Circle. See fig. 13.

DRAW a ſquare ABCD about it, and from the angles AD and CB draw diagonals, dividing the circle into eight parts, and through the points where they cut it OO, draw lines from the baſe line perpendicular to DEF.

Then draw two diagonals QR, SP, interſecting each other at right angles in the centre G.

Having thus diſpoſed the plan, draw lines from all the perpendiculars to the point of ſight H; and where they are interſected by the diagonals AK and BI, make points; the two laſt of which, M, N, give the ſquare, which is to be divided into four by diagonals, interſecting each other in the point P.

In the laſt place, from the extremes of this croſs, draw curve lines through the ſaid points, which will give the form of the circle in *perſpective*.

Of the Meaſures upon the Caſe in Perſpective.

BY the baſe line alone any depth may be given, and in any place at pleaſure, without the uſe of ſquares; which is a very expeditious way.

Plate CCXXXVII

As, for example, ſuppoſe the baſe line BS (fig. 1.) the point of view A, and the points of diſtance DE; if now you would make a plan of a cube BC, draw two occult or dotted lines from the extremes BC to the point of ſight: then, to give the breadth, take the ſame meaſure BC, and ſet it off on the terreſtrial line CF, and from F draw a line to the point of diſtance D; and where this line interſects the firſt ray C in the point G, will be the diminution of the plan of the cube BHGC.

If you would have an object farther towards the middle, take the breadth and the diſtance of the baſe line, as IK; and to have the depth, ſet it as you would have it on the ſame baſe as LM, and its width both on LM. Then from L and M draw occult lines to the point of diſtance D, and from the points NO, where thoſe lines interſect the ray K, draw parallels to the terreſtrial line, and you will have the ſquare QPON.

After the ſame manner you may ſet off the other ſide of the ſquare which ſhould be on the baſe, as BHGC is here tranſferred to V. The points M and T, which are only two feet from the point S, afford a very narrow figure in X, as being very near.

Of the Baſe Line, and a ſingle Point of Diſtance.

SINCE the depths and widths may be had by the means of this baſe line, there is no need of any further trouble in making of ſquares; as ſhall be ſhewn in this example.

Fig. 2.

Suppoſe a row of trees or columns is to be made on each ſide; on the baſe line lay down the place, and the diſtance between them, with their breadth or diameters, as ABCDEFG: then laying a ruler from the point of diſtance O to each of the points ABCDEFG, the interſections it makes on the viſual ray AH will be the bounds of the objects deſired.

To ſet them off on the other ſide upon the ray GH, ſet one foot of the compaſſes upon the point of the eye H, and with the other ſtrike an arch; the point wherein this cuts the ray GH, will be the correſponding bound.

Thus M will be the ſame with N, and ſo of the reſt; through which drawing parallels, you will have the breadths.

And as for the length, you may make it at pleaſure: ſetting it off from A, as for inſtance to P, and then from P drawing a line to H; and where this cuts the other parallels, will be formed the plan required; which you may make either round or ſquare.

To find the Height and Proportion of any Objects, as they appear above the Horizon on a ſuppoſed Plane.

Plate cCXXXVII. fig. 3. FIRST rule your horizontal line NO, and fix your point of ſight, as at M; then mark the place of your neareſt pillar, by making a dot for the baſe or bottom, as at A; and another for the ſummit or top, as at B: rule a line from A to the point of ſight M, and another from B to M, and theſe two lines will give the height of any number of pillars. As for example: Suppoſe you would have a pillar at C, fix your dot for the baſe, and rule from thence a parallel line to meet the diagonal AM at D: then rule the perpendicular DE to the diagonal BM: which perpendicular is the height of your figure required at C. Or, if you would place pillars at F and I, obſerve the ſame method, ruling the parallels FG and IK, and the perpendiculars GH and KL will give their heights at the diſtances required.

To find the diameter or thickneſs of pillars at any particular diſtances, you are alſo to be guided by that neareſt the baſe. For inſtance: Suppoſe your neareſt pillar AB to be ten feet high, and one foot in diameter: divide it from top to bottom into ten equal parts, and ſet off one of them upon the baſe of the pillar; then rule a line from the point of ſight M to the diameter P, and you will have the thickneſs of all your pillars on their reſpective parallels or baſes.

The ſame Rule exemplified in Objects below the Horizon.

ig. 4. IF you would know the heights of a number of figures below the horizon, rule your horizontal line QR, and fix your point of ſight, as at P: then place your neareſt figure, or mark the dots for the head and feet, by the points A and B, which anſwers the ſame purpoſe; and rule from theſe dots to the point of ſight the lines AP and BP: and if you would find the height of a figure to be drawn at *c*, rule from thence the parallel *cd* to the diagonal BP, and the perpendicular *de* will give the height required. The ſame directions will ſhew the height of a figure at any diſtance you have a mind to place it, as at *f*, *i*, and *m*, by ruling the parallels *fg*, *ik*, and *mn*; and from each of theſe their reſpective perpendiculars *gh*, *kl*, and *no*; which perpendiculars will ſhew the heights of the figures at *f*, *i*, and *m*.

To draw a Direct View.

ig. 5. To illuſtrate this example, ſuppoſe you were to draw the inſide of a church, as repreſented in this figure: Firſt take your ſtation at the point A, in the centre of the baſe line BC: from which you have a a front view of the whole body of the church, with all the pillars, &c. on each ſide: then fix your horizon on any height you think proper, as at DE: biſect it by the perpendicular EA: and where theſe two lines interſect, is the point of ſight F. This perpendicular will paſs through the centres of all the arches in the dome or cupola: which centres may be found by any three given points. Next divide your baſe line into any given number of feet; and the viſual lines, ruled from theſe diviſions to the point of ſight, will reduce all your objects to their juſt proportion, by ſetting off their height upon a perpendicular raiſed at their reſpective diſtances. The baſe, in the example here given, is divided into twelve equal parts of five feet each; from which (ſuppoſing your front column to be 35 feet high) take ſeven diviſions from the baſe line of your drawing, and ſet them off upon the perpendicular GH; then (ſuppoſing this column to be five feet thick at the baſe) ſet off one of theſe diviſions upon the parallel IK, which is the breadth required. So that, by proportioning this ſcale to any diſtance by the foregoing directions, you may not only find the dimenſions of all your columns, but alſo of every diſtinct part of them, as well as of all the doors, windows, and other objects that occur. For inſtance: Having found the height and breadth of your firſt or neareſt column G, draw from the top and bottom of the ſaid column to the point of ſight the lines HF and KF; after which, rule the line IF from the baſe of the column to the point of ſight, and you have the height and breadth of all the reſt of the columns, as has been already ſhewn in fig. 3.

By ruling lines from the points *a*, *b*, *c*, *d*, &c. to the point of ſight, you will ſee that all the ſummits and baſes of your columns, doors, windows, &c. muſt tend immediately to that point; and by lines drawn from the points 1, 2, 3, 4, &c. on each ſide, to the correſpondent points on the oppoſite ſide, may be ſeen all the parts of your building lying upon the ſame parallel.

To draw an Oblique View.

FIRST draw your horizontal line AB; then, if your favourite object be on the right hand, as at C, place yourſelf on the left hand upon the baſe line, as at D; then from that ſtation erect a perpendicular DE, which will paſs thro' the horizon at the point of ſight F: to which rule the diagonals GF and HF, which will ſhew the roof and baſe of your principal building C, and will alſo, as before directed, ſerve as a ſtandard for all the reſt. Fig. 6.

Obſerve alſo, either in direct or oblique views, whether the proſpect before you make a curve; for if it does, you muſt be careful to make the ſame curve in your drawing.

To draw a Perſpective View, wherein are accidental Points.

RULE your horizontal line *ab*, and on one part of it fix your point of ſight, as at *c*; from which rule the diagonals *cd* and *ce* on the one ſide, and *cf* and *cq* on the other; which will ſhew the roofs and baſes of all the houſes in the ſtreet directly facing you, (ſuppoſing yourſelf placed at A in the centre of the baſe line): Then fix your accidental points *g* and *h* upon the horizontal line, and rule from them to the angles *ik* and *lm*, (where ſtreets on each ſide take a different direction, towards the accidental points *g* and *h*), and the lines *gi* and *gk* give the roofs and baſes of all the buildings on one ſide, as *lh* and *mh* do on the other. Fig. 7.

Accidental points ſeldom intervene where the diſtance is ſmall, as in noblemens ſeats, groves, canals, &c. which may be drawn by the ſtrict rules of perſpective; but where the proſpect is extenſive and varied, including mountains, bridges, caſtles, rivers, precipices, woods, cities, &c. it will require ſuch an infinite number of accidental points, that it will be better to do them as nature ſhall dictate, and your ripened judgment approve.

To find the Centre for the Roof of a Houſe, in an Oblique View.

Plate ccxxxvii. fig. 8.

SUPPOSE from the point of ſight A, the viſual lines AB and AC be drawn, BC being one perpendicular given, and DE the other, rule the diagonals from D to C, and from E to E, and the perpendicular FG, raiſed through the point of their interſection, will ſhew the true centre of the roof, as will appear by ruling the lines GE and GC.

For want of being acquainted with this neceſſary rule, many who have been well verſed in other parts of perſpective, have ſpoiled the look of their picture, by drawing the roofs of their houſes out of their true perpendicular.

WE ſhall conclude by giving a few practical rules. 1. Let every line, which in the object, or geometrical figure, is ſtraight, perpendicular, or parallel to its baſe, be ſo alſo in its ſcenographic delineation. 2. Let the lines, which in the object return at right angles from the fore-right ſide, be drawn ſcenographically from the viſual point. 3. Let all ſtraight lines, which in the object return from the fore-right ſide, run in a ſcenographic figure into the horizontal line. 4. Let the object you intend to delineate, ſtanding on your right-hand, be placed alſo on the right-hand of the viſual point; and that on the left-hand, on the left-hand of the ſame point; and that which is juſt before, in the middle of it. 5. Let thoſe lines which are (in the object) equidiſtant to the returning line be drawn in the ſcenographic figure, from that point found in the horizon. 6. In ſetting off the altitude of columns, pedeſtals, and the like, meaſure the height from the baſe line upwards, in the front or fore-right ſide; and a viſual ray down that point in the front ſhall limit the altitude of the column or pillar, all the way behind the fore-right ſide, or orthographic appearance, even to the viſual point. This rule you muſt obſerve in all figures, as well where there is a front or fore-right ſide, as where there is none. 7. In delineating ovals, circles, arches, croſſes, ſpirals, and croſs-arches, or any other figure in the roof of any room, firſt draw ichnographically, and ſo with perpendiculars from the moſt eminent points thereof, carry it up into the ceiling; from which ſeveral points, carry on the figure. 8. The centre in any ſcenographic regular figure is found by drawing lines from oppoſite angles; for the point where the diagonals croſs is the centre. 9. A ground-plane of ſquares is alike, both above and below the horizontal line; only the more it is diſtant above or beneath the horizon, the ſquares will be ſo much the larger or wider. 10. In drawing a perſpective figure, where many lines come together, you may, for the directing of your eye, draw the diagonals in red; the viſual lines in black; the perpendiculars in green, or other different colour, from that which you intend the figure ſhall be of. 11. Having conſidered the height, diſtance, and poſition of the figure, and drawn it accordingly, with the ſide or angle againſt the baſe; raiſe perpendiculars from the ſeveral angles, or deſigned points, from the figure of the baſe, and transfer the length of each perpendicular, from the place where it touches the baſe, to the baſe on the ſide oppoſite to the point of diſtance; ſo will the diametrals drawn to the perpendiculars in the baſe, by interſection with the diagonals, drawn to the ſeveral transferred diſtances, give the angles of the figures, and ſo lines drawn from point to point will circumſcribe the ſcenographic figure. 12. If in a landſcape there be any ſtanding waters, as rivers, ponds, and the like, place the horizontal line level with the fartheſt ſight or appearance of it. 13. If there be any houſe, or the like, in the picture, conſider their poſition, that you may find from what point in the horizontal lines to draw the front and ſides thereof. 14. In deſcribing things at a great diſtance, obſerve the proportion, both in magnitude and diſtance, in draught, which appears from the object to the eye. 15. In colouring and ſhadowing of every thing, you muſt do the ſame in your picture, which you obſerve with your eye, eſpecially in objects lying near; but, according as the diſtance grows greater and greater, ſo the colours muſt be fainter and fainter, till at laſt they loſe themſelves in a darkiſh ſky-colour. 16. The catoptrics are beſt ſeen in a common looking-glaſs, or other poliſhed matter; where, if the glaſs be exactly flat, the object is exactly like its original; but, if the glaſs be not flat, the reſemblance alters from the original; and that more or leſs, according as the glaſs differs from an exact plane. 17. In drawing catoptric figures, the ſurface of the glaſs is to be conſidered, upon which you mean to have the reflection; for which you muſt make a particular ichnographical draught, or projection; which on the glaſs muſt appear to be a plane full of ſquares, on which projection transfer what ſhall be drawn on a plane, divided into the ſame number of like ſquares; where though the draught may appear very confuſed, yet the reflection of it on the glaſs will be very regular, proportional, and regularly compoſed. 18. The dioptric, or broken beam, may be ſeen in a tube through a cryſtal or glaſs, which hath its ſurface cut into many others, whereby the rays of the object are broken. For to the flat of the cryſtal, or water, the rays run ſtraight; but then they break and make an angle, which alſo by the refracted beams is made and continued on the other ſide of the ſame flat. 19. When theſe faces on a cryſtal are returned towards a plane placed directly before it, they ſeparate themſelves at a good diſtance on the plane; becauſe they are all directed to various far diſtant places of the ſame. See OPTICS.

Of the Anamorphoſis, or Reformation of Diſtorted Images.

BY this means pictures that are ſo miſhapen, as to exhibit no regular appearance of any thing to the naked eye, ſhall, when viewed by reflection, preſent a regular and beautiful image. The inventor of this ingenious device is not known. Simon Stevinus, who was the firſt that wrote upon it, does not inform us from whom he learned it. The principles of it are laid down by S. Vauzelard in his *Perſpective Conique et Cylindrique;* and Gaſpar Schott profeſſes to copy Marius Bettinus in his deſcription of this piece of artificial magic.

It will be ſufficient for our purpoſe to copy one of the ſimpleſt figures of this writer, as by this means the myſtery of this art will be ſufficiently unfolded. Upon the cylinder of paper, or paſteboard, ABCD, draw whatever is intended to be exhibited, as the letters

Plate ccxxxvii fig. 1.

Fig. 1.

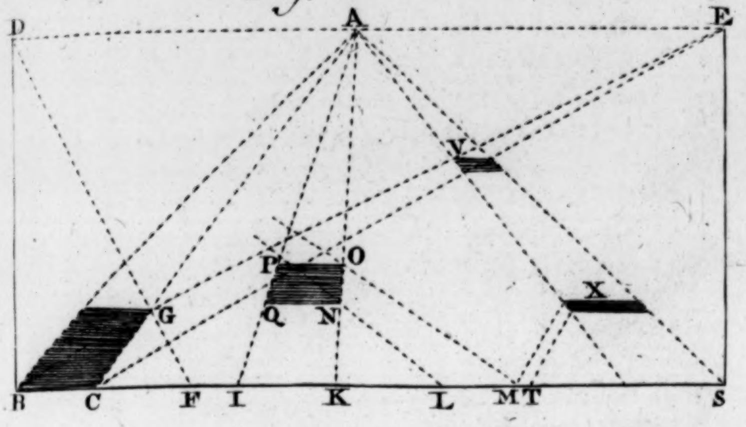

D
A
E
V
P
O
Q
N
G
X
B
C
F
I
K
L
M
T
S

Fig. 2.

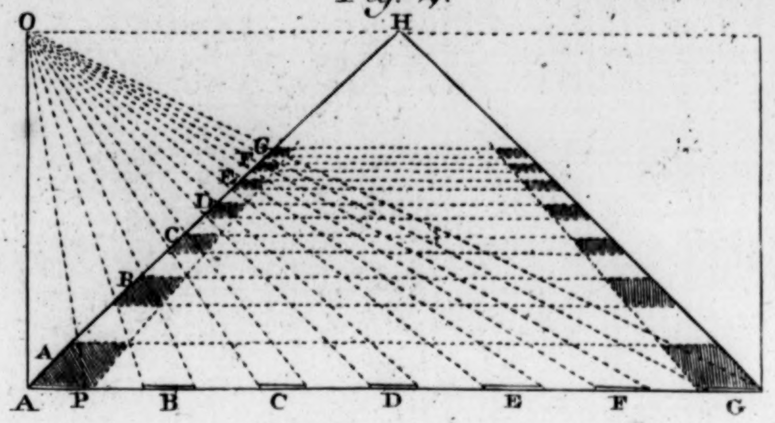

O
H
G
F
E
D
C
B
A
I
A
P
B
C
D
E
F
G

Fig. 3.

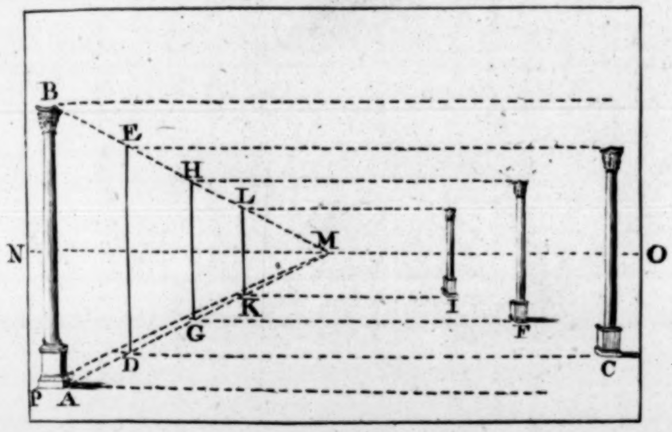

B
E
H
L
M
N
O
K
G
D
I
F
C
P
A

Fig. 4.

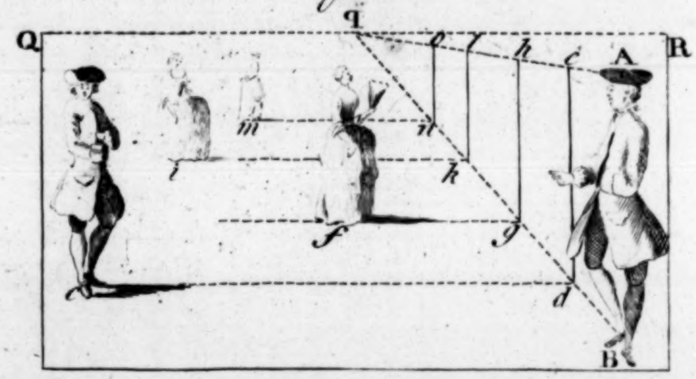

Q
q
o
l
h
c
A
R
m
n
i
k
f
g
d
B

Fig. 5.

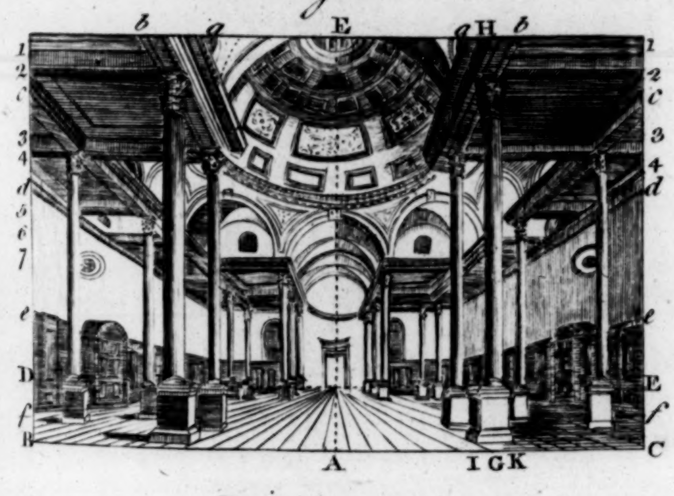

b
a
E
a
H
b
1
2
c
3
4
d
5
6
7
e
D
f
B
A
I G K
1
2
c
3
4
d
e
E
f
C

Fig. 6.

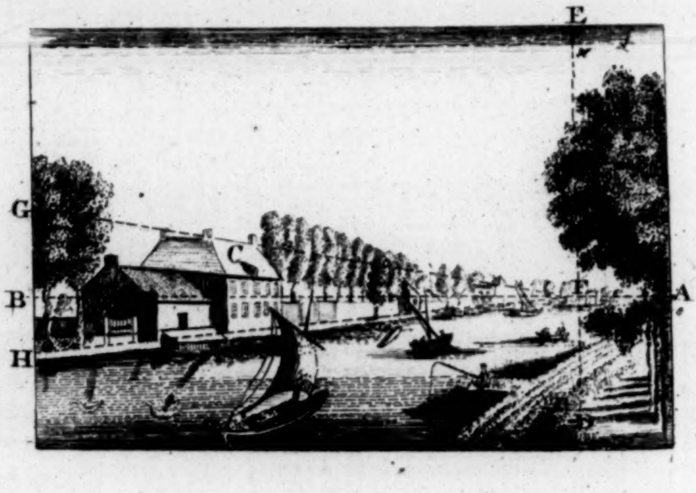


Fig. 7.

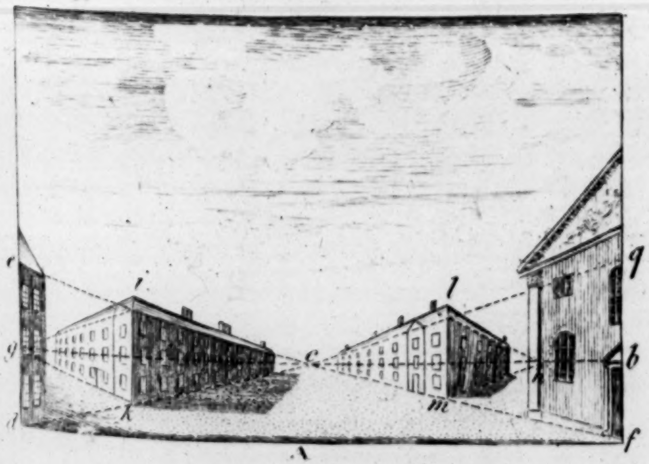
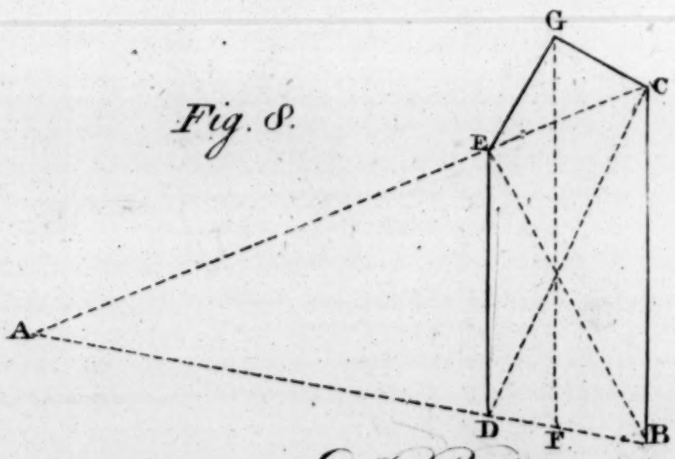

e
i
l
q
g
c
b
k
m
d
f
A

Fig. 8.



A. Bell sc.

3 MA 53

3 MA 53

Plate CCXXXVIII.

Fig. 1.

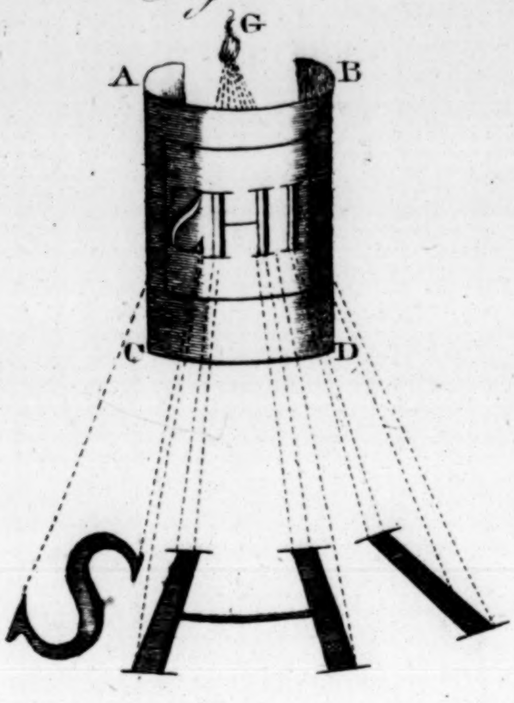

G
A
B
ZHI
C
D
SHI

Fig. 2.
PHOLAS.

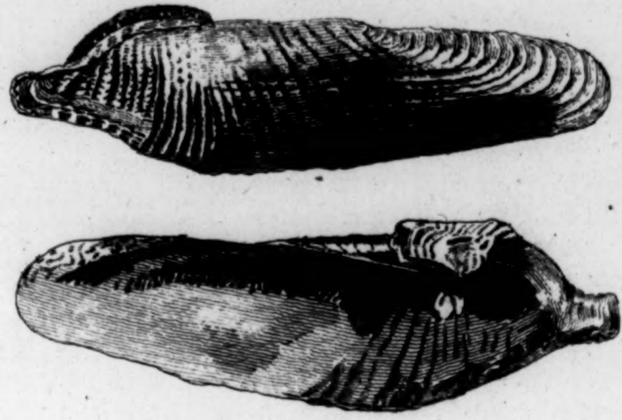


Fig. 35.

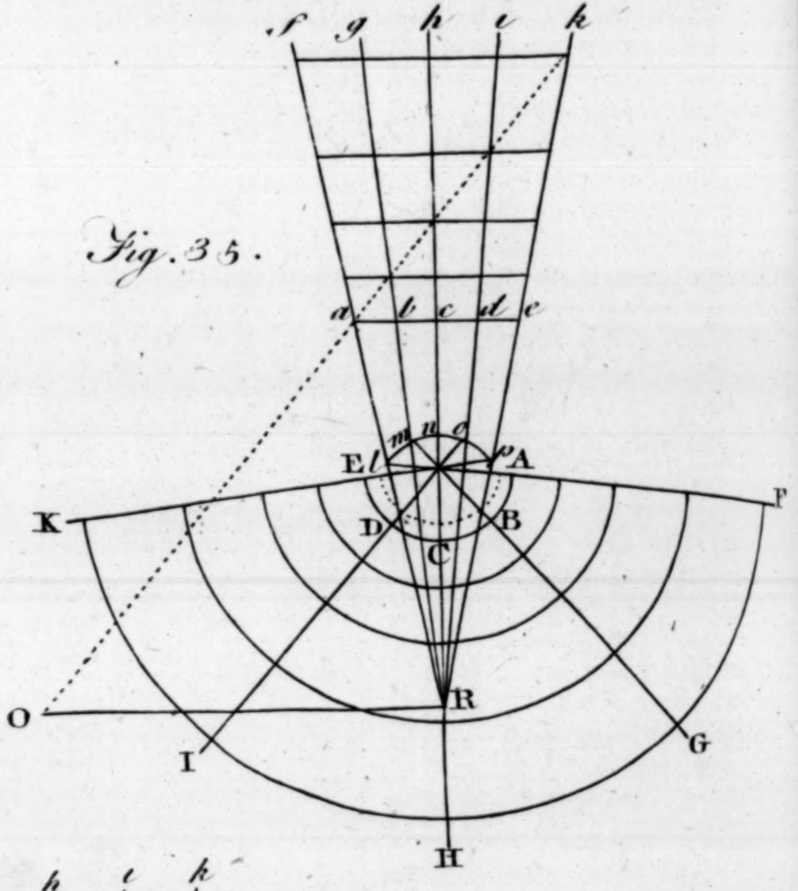

f
g
h
i
k
a
b
c
d
e
l
m
n
o
p
E
A
K
F
D
B
C
R
O
I
G
H

Fig. 1. (B).
PHŒNICOPTERUS Ruber
The Flamingo.

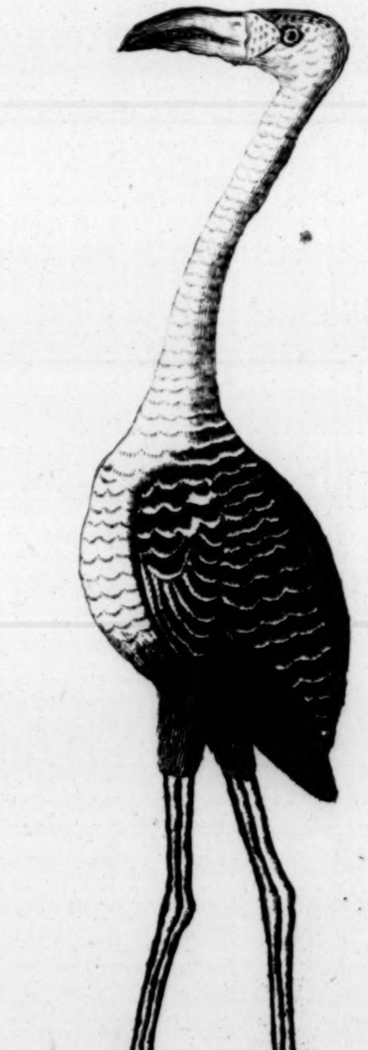


Fig. 34.

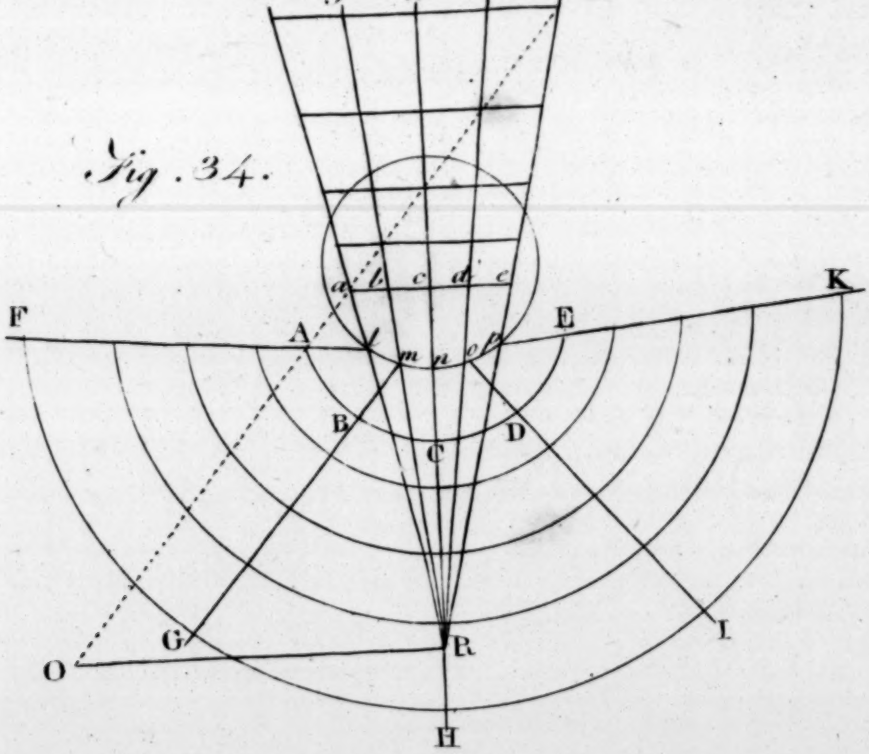
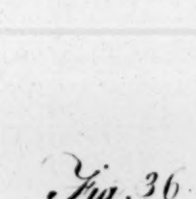

f
g
h
i
k
a
b
c
d
e
F
A
l
m
n
o
p
E
K
B
C
D
O
G
R
I
H

Fig. 36



A Bell Sculp.

ters IHS. Then with a needle make perforations along the whole out-line; and placing a candle, G, behind this cylinder, mark upon the ground-plane the ſhadow of them, which will be diſtorted more or leſs, according to the poſition of the candle or the plane, &c. This being done, let the picture be an exact copy of this diſtorted image, let a metallic ſpeculum be ſubſtituted in the place of the cylinder, and let the eye of the ſpectator have the ſame poſition before the cylinder that the candle had behind it. Then looking upon the ſpeculum, he will ſee the diſtorted image reſtored to its proper ſhape. The reformation of the image, he ſays, will not eaſily be made exact in this method, but it will be ſufficiently ſo to anſwer the purpoſe.

Other methods, more exact and geometrical than this, were found out afterwards: ſo that theſe pictures could be drawn by certain rules, without the uſe of a candle. Schott quotes one of theſe methods from Bettinus, another from Herigonius, and another from Kircher, which may be ſeen in his *Magia*, vol. i. p. 162, &c. He alſo gives an account of the methods of reforming pictures by ſpeculums of conical, and other figures.

Inſtead of copying any of theſe methods from Schott or Bettinus, we ſhall preſent our readers with that which Dr Smith hath given us in his Optics, vol. i. p. 250, as, no doubt, the beſt, and from which any perſon may eaſily make a drawing of this kind. The ſame deſcription anſwers to two mirrors, one of which, fig. 34. is convex, and the other, fig. 35. is concave.

In order to paint upon a plane a deformed copy ABCDEKIHGF of an original picture, which ſhall appear regular, when ſeen from a given point O, elevated above the plane, by rays reflected from a poliſhed cylinder, placed upon the circle *lnp*, equal to its given baſe; from the point R, which muſt be ſuppoſed to lie perpendicularly under O, the place of the eye, draw two lines R*a* R*e*; which ſhall either touch the baſe of the cylinder, or elſe cut off two ſmall equal ſegments from the ſides of it, according as the copy is intended to be more or leſs deformed. Then, taking the eye, raiſed above R, to the given height RO, ſomewhat greater than that of the cylinder, for a luminous point, deſcribe the ſhadow *aekf* (of a ſquare *aexz*, fig. 36, or parallelogram ſtanding upright upon its baſe *ae*, and containing the picture required) any where behind the arch *lnp*. Let the lines drawn from R to the extremities and diviſions of the baſe *a*, *b*, *c*, *d*, *e*, cut the remoteſt part of the ſhadow in the points *f*, *g*, *h*, *i*, *k*, and the arch of the baſe in *l*, *m*, *n*, *o*, *p*; from which points draw the lines *l*AF, *m*BG, *n*CH, *o*DI, *p*EK, as if they were rays of light that came from a focus R, and were reflected from the baſe *lnp*; ſo that each couple, as *l*A, *l*R, produced, may cut off equal ſegments from the circle. Laſtly, transfer the lines *laf*, *mbg*, &c. and all their parts, in the ſame order, upon the reſpective lines *l*AF, *m*BG, &c. and having drawn regular curves, by eſtimation, through the points A, B, C, D, E, through F, G, H, I, K, and through every intermediate order of points; the figure ACEKHF, ſo divided, will be the deformed copy of the ſquare, drawn and divided upon the original picture, and will appear ſimilar to it, when ſeen in the poliſhed cylinder, placed upon the baſe *lnp*, by the eye in its given place O.

The practical methods of drawing theſe images ſeem to have been carried to the greateſt perfection by J. Leopold, who, in the Acta Lipſienſia, for the year 1712, has deſcribed two machines, one for the images to be viewed with a cylindrical, and the other with a conical, mirror. The perſon poſſeſſed of this inſtrument has nothing to do but to take any print he pleaſes, and while he goes over the out-lines of it with one pen, another traces the anamorphoſis.

By methods of this kind, groves of trees may be cut, ſo as to repreſent the appearance of men, horſes, and other objects from ſome one point of view, which are not at all diſcernible in any other. This might eaſily be effected by one perſon placing himſelf in any particular ſituation, and giving directions to other perſons what trees to lop, and in what manner. In the ſame method it has been contrived, that buildings, of circular and other forms, and alſo whole groupes of buildings, conſiſting of walls at different diſtances, and with different poſitions to one another, ſhould be painted ſo as to exhibit the exact repreſentation of particular objects, which could only be perceived in one ſituation. Bettinus has illuſtrated this method by drawings in his *Apiaria*.

Perspective *Glaſs*, or *Graphical Perſpective*, in optics. See there, p. 5584.

PERSPIRATION, in medicine, the evacuation of the juices of the body through the pores of the ſkin. Perſpiration is diſtinguiſhed into ſenſible and inſenſible; and here ſenſible perſpiration is the ſame with ſweating, and inſenſible perſpiration that which eſcapes the notice of the ſenſes; and this laſt is the idea affixed to the word *perſpiration* when uſed alone.

PERSPICUITY, properly ſignifies the property which any thing has of being eaſily ſeen through; hence is generally applied to ſuch writings or diſcourſes as are eaſily underſtood.

Perspicuity, in compoſition. See **Oratory**, n° 42.

PERTH, a county of Scotland, including Menteith, Braidalbin, Athol, Stratherne, part of Gowrie, and Perth Proper; is bounded by Badenoch and Lochaber on the north and north-weſt; by Marr on the north-eaſt; by Argyle and Lennox on the weſt and ſouth-weſt; having Clackmannanſhire, part of Stirlingſhire, and the Forth to the ſouth; the ſhires of Kinroſs and Fife to the ſouth-eaſt, and Angus to the eaſt. It extends above 70 miles in length, and near 60 at its greateſt breadth, exhibiting a variety of Highlands and Lowlands; mountains, hills, dales, and ſtraths, diverſified with paſture-grounds, corn-fields, and meadows; rivers, lakes, foreſts, woods, plantations, incloſures, towns, villages, and a great number of elegant ſeats, beautifully ſituated, belonging to noblemen and gentlemen. The chief rivers of Perthſhire are the Tay, the Keith, and the Ierne, beſides a great number of ſubordinate ſtreams. The Tay, which is the largeſt river in Scotland, derives its ſource from the

Plate CCXXXVIII.

Fig. 1.

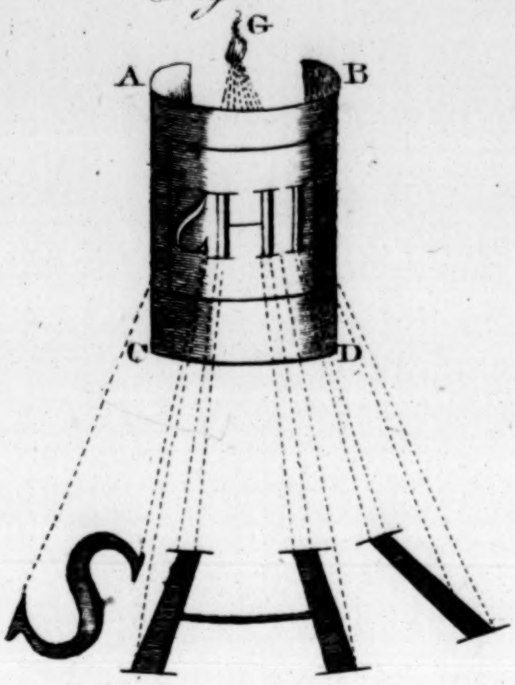

G
A
B
CHI
C
D
SHV

Fig. 2.
PHOLAS.

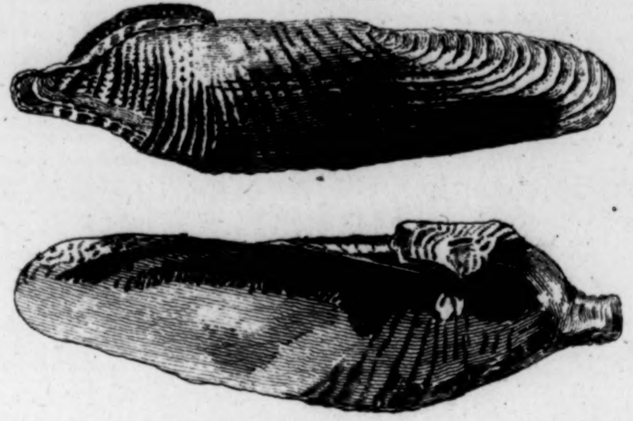


Fig. 35.

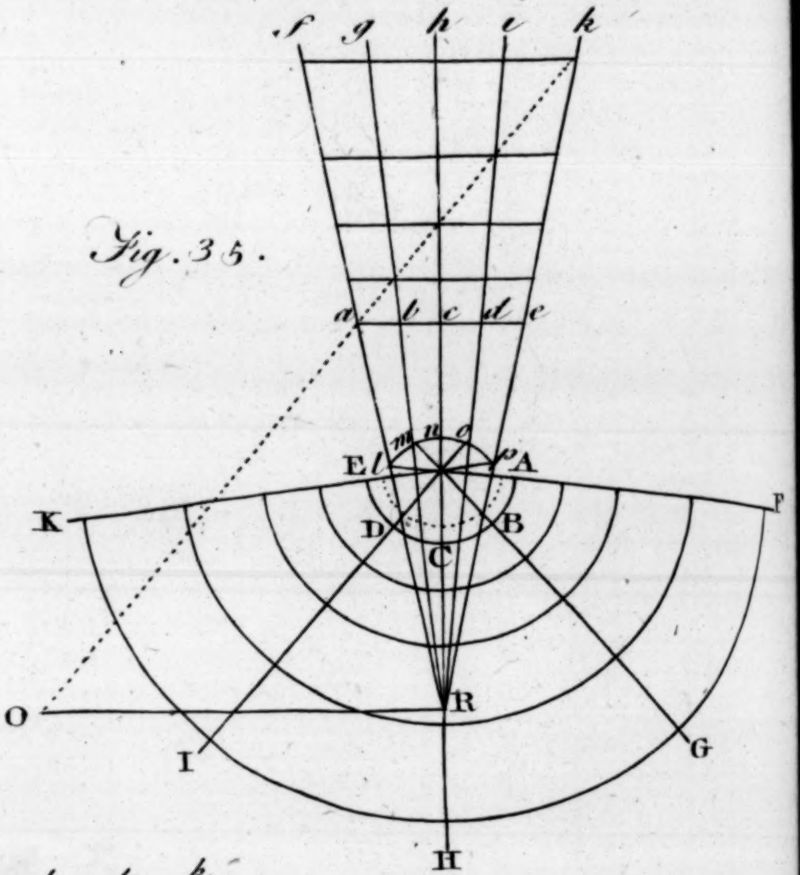

f
g
h
i
k
a
b
c
d
e
l
m
n
o
p
E
A
K
F
D
B
C
O
R
I
G
H

Fig. 1.(B).
PHŒNICOPTERUS Ruber
The Flamingo.

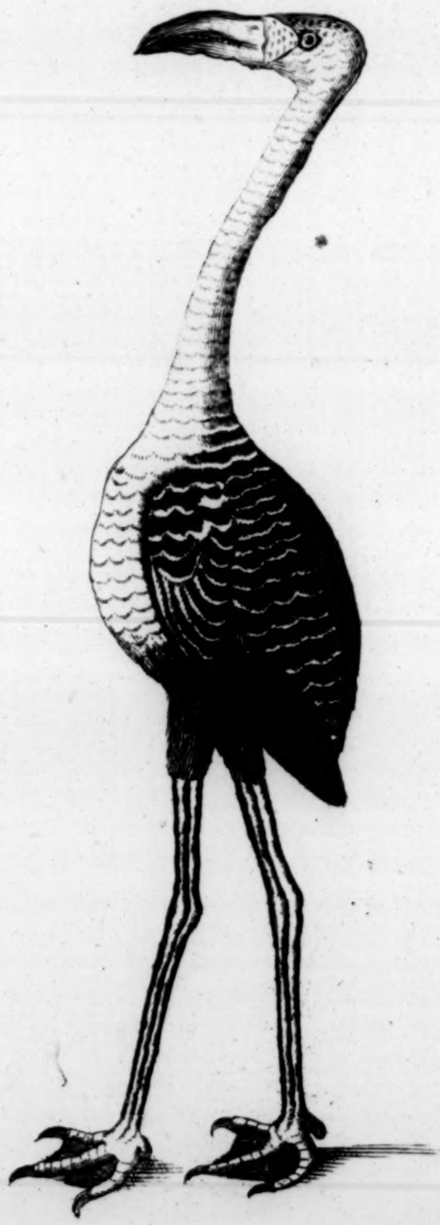


Fig. 34.

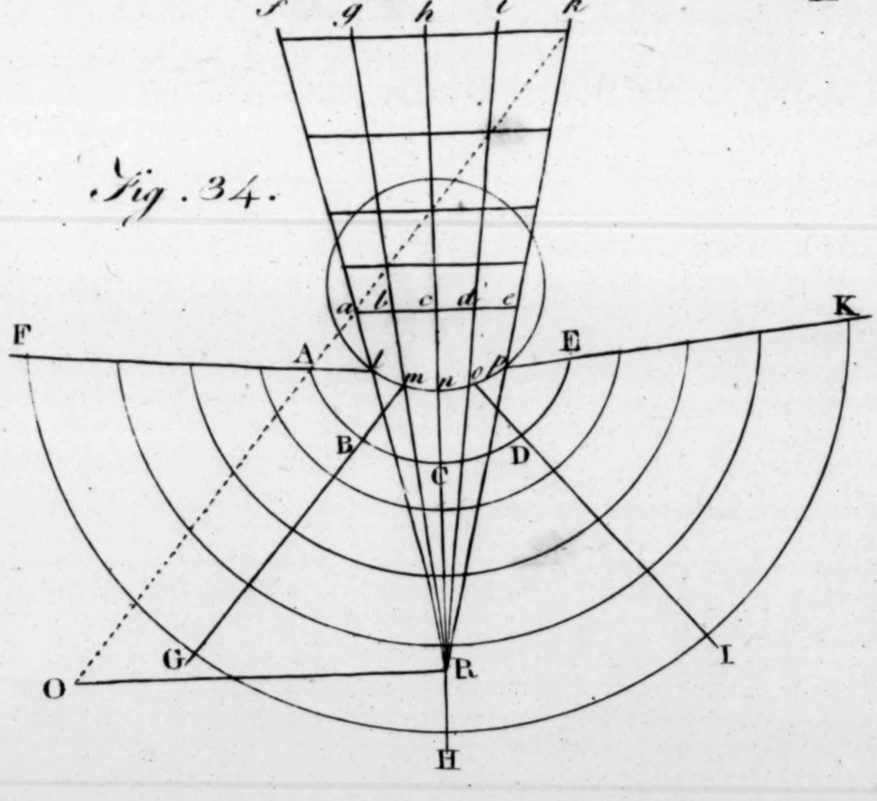
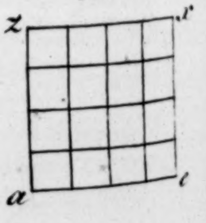

f
g
h
i
k
a
b
c
d
e
F
A
l
m
n
o
p
E
K
B
D
C
O
G
R
I
H

Fig. 36



A Bell Sculp.

ters IHS. Then with a needle make perforations along the whole out-line; and placing a candle, G, behind this cylinder, mark upon the ground-plane the ſhadow of them, which will be diſtorted more or leſs, according to the poſition of the candle or the plane, &c. This being done, let the picture be an exact copy of this diſtorted image, let a metallic ſpeculum be ſubſtituted in the place of the cylinder, and let the eye of the ſpectator have the ſame poſition before the cylinder that the candle had behind it. Then looking upon the ſpeculum, he will ſee the diſtorted image reſtored to its proper ſhape. The reformation of the image, he ſays, will not eaſily be made exact in this method, but it will be ſufficiently ſo to anſwer the purpoſe.

Other methods, more exact and geometrical than this, were found out afterwards: ſo that theſe pictures could be drawn by certain rules, without the uſe of a candle. Schott quotes one of theſe methods from Bettinus, another from Herigonius, and another from Kircher, which may be ſeen in his *Magia*, vol. i. p. 162, &c. He alſo gives an account of the methods of reforming pictures by ſpeculums of conical, and other figures.

Inſtead of copying any of theſe methods from Schott or Bettinus, we ſhall preſent our readers with that which Dr Smith hath given us in his Optics, vol. i. p. 250, as, no doubt, the beſt, and from which any perſon may eaſily make a drawing of this kind. The ſame deſcription anſwers to two mirrors, one of which, fig. 34. is convex, and the other, fig. 35. is concave.

In order to paint upon a plane a deformed copy ABCDEKIHGF of an original picture, which ſhall appear regular, when ſeen from a given point O, elevated above the plane, by rays reflected from a poliſhed cylinder, placed upon the circle *lnp*, equal to its given baſe; from the point R, which muſt be ſuppoſed to lie perpendicularly under O, the place of the eye, draw two lines R*a* R*e*; which ſhall either touch the baſe of the cylinder, or elſe cut off two ſmall equal ſegments from the ſides of it, according as the copy is intended to be more or leſs deformed. Then, taking the eye, raiſed above R, to the given height RO, ſomewhat greater than that of the cylinder, for a luminous point, deſcribe the ſhadow *aekf* (of a ſquare *aexz*, fig. 36, or parallelogram ſtanding upright upon its baſe *ae*, and containing the picture required) any where behind the arch *lnp*. Let the lines drawn from R to the extremities and diviſions of the baſe *a*, *b*, *c*, *d*, *e*, cut the remoteſt part of the ſhadow in the points *f*, *g*, *h*, *i*, *k*, and the arch of the baſe in *l*, *m*, *n*, *o*, *p*; from which points draw the lines *l*AF, *m*BG, *n*CH, *o*DI, *p*EK, as if they were rays of light that came from a focus R, and were reflected from the baſe *lnp*; ſo that each couple, as *l*A, *l*R, produced, may cut off equal ſegments from the circle. Laſtly, transfer the lines *laf*, *mbg*, &c. and all their parts, in the ſame order, upon the reſpective lines *l*AF, *m*BG, &c. and having drawn regular curves, by eſtimation, through the points A, B, C, D, E, through F, G, H, I, K, and through every intermediate order of points; the figure ACEKHF, ſo divided, will be the deformed copy of the ſquare, drawn and divided upon the original picture, and will appear ſimilar to it, when ſeen in the poliſhed cylinder, placed upon the baſe *lnp*, by the eye in its given place O.

The practical methods of drawing theſe images ſeem to have been carried to the greateſt perfection by J. Leopold, who, in the Acta Lipſienſia, for the year 1712, has deſcribed two machines, one for the images to be viewed with a cylindrical, and the other with a conical, mirror. The perſon poſſeſſed of this inſtrument has nothing to do but to take any print he pleaſes, and while he goes over the out-lines of it with one pen, another traces the anamorphoſis.

By methods of this kind, groves of trees may be cut, ſo as to repreſent the appearance of men, horſes, and other objects from ſome one point of view, which are not at all diſcernible in any other. This might eaſily be effected by one perſon placing himſelf in any particular ſituation, and giving directions to other perſons what trees to lop, and in what manner. In the ſame method it has been contrived, that buildings, of circular and other forms, and alſo whole groupes of buildings, conſiſting of walls at different diſtances, and with different poſitions to one another, ſhould be painted ſo as to exhibit the exact repreſentation of particular objects, which could only be perceived in one ſituation. Bettinus has illuſtrated this method by drawings in his *Apiaria*.

Perspective *Glaſs*, or *Graphical Perſpective*, in optics. See there, p. 5584.

PERSPIRATION, in medicine, the evacuation of the juices of the body through the pores of the ſkin. Perſpiration is diſtinguiſhed into ſenſible and inſenſible; and here ſenſible perſpiration is the ſame with ſweating, and inſenſible perſpiration that which eſcapes the notice of the ſenſes; and this laſt is the idea affixed to the word *perſpiration* when uſed alone.

PERSPICUITY, properly ſignifies the property which any thing has of being eaſily ſeen through; hence is generally applied to ſuch writings or diſcourſes as are eaſily underſtood.

Perspicuity, in compoſition. See Oratory, n° 42.

PERTH, a county of Scotland, including Menteith, Braidalbin, Athol, Stratherne, part of Gowrie, and Perth Proper; is bounded by Badenoch and Lochaber on the north and north-weſt; by Marr on the north-eaſt; by Argyle and Lennox on the weſt and ſouth-weſt; having Clackmannanſhire, part of Stirlingſhire, and the Forth to the ſouth; the ſhires of Kinroſs and Fife to the ſouth-eaſt, and Angus to the eaſt. It extends above 70 miles in length, and near 60 at its greateſt breadth, exhibiting a variety of Highlands and Lowlands; mountains, hills, dales, and ſtraths, diverſified with paſture-grounds, corn-fields, and meadows; rivers, lakes, foreſts, woods, plantations, incloſures, towns, villages, and a great number of elegant ſeats, beautifully ſituated, belonging to noblemen and gentlemen. The chief rivers of Perthſhire are the Tay, the Keith, and the Ierne, beſides a great number of ſubordinate ſtreams. The Tay, which is the largeſt river in Scotland, derives its ſource from

Perth.

the mountains of Braidalbin, and ſpreads itſelf into a lake, called *Loch Tay*, 15 miles in length and ſix in breadth; then, after a winding courſe of 40 miles, during which it is ſwelled by many brooks and rivulets, it ends in the Frith of Tay, a broad navigable inlet, which opens to the ſea, not far from the bay of St Andrews. The river Keith is famous for its ſalmon-fiſhery, and its ſteep cataract, near the Blair of Drummond, the noiſe of which is ſo loud as to deafen thoſe who approach it. The river Ierne raiſes from Loch-ierne, a lake ſeven miles long, in the mountainous country of Stratherne: this river, after a courſe of 34 miles from eaſt to weſt, during which it receives many ſtreams and rivulets, falls into the Tay, at Abernethy.

Free-ſtone, lead, iron, and copper ores, with ſome lapis calaminaris, are found in different places of Perthſhire. The ſoil, being generally rich and well manured, produces excellent wheat, and all kinds of grain. The hilly country abounds with paſture for the black cattle, horſes, ſheep, goats, and deer. The heaths, woods, and foreſts, are ſtored with variety of game; the rivers teem with ſalmon and trout; the gardens and orchards are ſtored with all kinds of herbs, roots, apples, pears, cherries, plums, and almoſt every ſpecies of fruit found in South Britain. The houſes and attire, even of the commonalty, are neat and decent; and every peaſant can produce a good quantity of linen, and great ſtore of blankets, made in his own family. Indeed, this is the caſe through all the Lowlands of Scotland. Flax is reared by every huſbandman; and being dreſſed at home, is ſpun by the females of his family into thread for linen; this is woven by country weavers, of whom there is a great number through all the Low Country, and afterwards bleached or whitened by the good-wife and her ſervants; ſo that the whole is made fit for uſe at a very ſmall expence. They likewiſe waſh, card, ſpin, and weave their wool into tartan for plaids, kerſies, and coarſe ruſſet-cloth, for common wearing, beſides great part of it which is knit into caps, ſtockings, and mitts. Plaids, made of the fineſt worſted, are worn either plain or variegated, as veils, by women of the lower, and even of the middle rank; nay, ſome years ago, ladies of faſhion wore ſilken plaids with an undreſs: this is a looſe piece of drapery, gathered about the head, ſhoulders, and waiſt, on which it is croſſed, ſo as to leave the hands at liberty, and produces a very good effect to the eye of the ſpectator. The Lowlanders of Perthſhire are civilized, hoſpitable, and induſtrious: the commerce of the country conſiſts chiefly in corn, linen, and black cattle: there are, moreover, ſome merchants who trade to foreign countries.—For an account of the different diviſions of this county above mentioned, ſee the articles as they occur in the order of the alphabet.

Perth *Proper*, ſtretching 20 miles in length, and, at ſome places, 15 in breadth, is bounded on the north-eaſt, by the Carſe of Gowrie; on the eaſt, by Angus; on the weſt, by Stratherne; on the north, by Athol; and on the ſouth, by the Frith of Tay. This is likewiſe a fruitful country, populous, and well cultivated, abounding with gentlemen who poſſeſs opulent eſtates; with farmers who underſtand agriculture; and with manufacturers who turn their induſtry to great account. North-eaſtward from Perth to Brechin, lies the vale of Strathmore, one of the moſt fertile diſtricts in Scotland, which gives the title of *Earl* to the noble family of Lyon.

Perth, the capital of the county of that name, is an agreeable, populous town, ſituated 20 miles within land, on the ſouth bank of the river Tay. It was otherwiſe called *St Johnſton's*, from a church dedicated to St John, as the patron of the place. It is a royal borough, ſecond in dignity to the metropolis, the ſeat of a large preſbytery, and gave the title of *Earl* to the family of Drummond, which is now forfeited. Perth, in the reign of Edward I. of England, was poſſeſſed by the Engliſh, who ſecured it with fortifications: but, after an obſtinate reſiſtance, they were expelled by Robert Bruce. In the year 1715, the rebels made it a place of arms, and retired to it, after the battle of Dumblaine; but they were in a little time diſlodged by the duke of Argyle, and retreated northwards with the pretender. The town is populous and handſome; the ſtreets are well paved, and tolerably clean at all times; and the houſes, tho' not ſtately, make a very decent appearance. Here is a large church, an old palace that belonged to the earls of Gowrie, but now devolved to the crown; a ſtately town-houſe, ſeveral other public edifices, and houſes belonging to gentlemen. A monaſtery of Carthuſians was here eſtabliſhed by king James I. of Scotland, who loſt his life on the very ſpot, by the treachery of Athol and his accomplices. The town was anciently provided with a ſtone-bridge over the river, which an inundation ſwept away; but a new and very fine one has lately been built.

This town has but one pariſh, which has two churches, beſides meetings for ſeparatiſts, who are very numerous. One church, which belonged to a monaſtery, is very ancient: not a veſtige of the laſt is now to be ſeen; for the diſciples of Knox made a general deſolation of every edifice that had given ſhelter to the worſhippers of the church of Rome: it being one of his maxims, to pull down the neſts, and then the rooks would fly away.

The flouriſhing ſtate of Perth is owing to two accidents: the firſt, that of numbers of Cromwell's wounded officers and ſoldiers chooſing to reſide here, after he left the kingdom, who introduced a ſpirit of induſtry among the people: the other cauſe was the long continuance of the earl of Mar's army here in 1715, which occaſioned vaſt ſums of money being ſpent in the place. But this town, as well as all Scotland, dates its proſperity from the year 1745; the government of this part of Great Britain having never been ſettled till a little after that time.

The trade of Perth is conſiderable. It exports annually 150,000 l. worth of linen, from 24,000 to 30,000 bolls of wheat and barley to London and Edinburgh, and about the ſame in cured ſalmon. That fiſh is taken there in vaſt abundance; 3000 have been caught in one morning, weighing, one with another, 16 pounds; the whole capture, 48,000 pounds. The fiſhery begins at St Andrew's day, and ends Auguſt 26th, old ſtyle. The rents of the fiſheries amount to 3000l. per annum. Smelts come up this river in May and June.

There has been in theſe parts a very great fiſhery of pearl, got out of the freſh-water muſcles. From the year 1761 to 1764, 10,000l. worth were ſent to London, and ſold for 10s. to 1 l. 16s. per ounce. Mr Pennant was told that a pearl has been taken there that weighed 33 grains. But this fiſhery is at preſent exhauſted, from the avarice of the undertakers: it once extended as far as Loch-Tay.

PERTINAX, an illuſtrious Roman, raiſed himſelf by his valour and merit to the conſular dignity; and upon the death of Commodus, was elected emperor by the prætorian band in 193. Though he owed his elevation to theſe ſoldiers, his firſt care was to repreſs their inſolence, and to oblige them to obſerve ſtrict diſcipline; upon which they revolted, and in the tumult one of the private men aſſaſſinated this renowned hero, who was the father of his people, after a reign of 87 days.

PERTINENT OF LANDS, in Scots law. See LAW, N° cxlvii. 6.

PERU, a country of South America, bounded on the north by Popayan, on the weſt by the South Sea, and on the eaſt by the vaſt ridge of mountains called the *Andes*; and extending 1500 miles in length from north to ſouth, though only 125 in breadth from eaſt to weſt, between the Andes and the ſea; though in other places it is much broader, and, according to ſome, not leſs than 300 miles.

1
How diſcovered by the Spaniards.

This country was diſcovered by the Spaniards; and the firſt intelligence they had of it was on the following occaſion. Nunez de Balboa having been raiſed to the government of the ſmall colony at Santa Maria in Darien by the ſuffrages of his companions, was very deſirous of having that authority confirmed by the court of Spain. For this purpoſe he endeavoured to recommend himſelf to the Spaniſh miniſtry by ſome important ſervice; that is, by extorting from the Indians as much gold and ſilver as he could. He therefore made frequent inroads into the adjacent country, ſubdued ſeveral of the caciques or petty princes, and collected a conſiderable quantity of gold. In one of theſe expeditions, the Spaniards contended ſo violently about the diviſion of ſome gold which they had taken, that they were on the point of coming to blows with one another. A young cacique who was preſent, aſtoniſhed at ſuch contention about a thing of which he knew not the uſe, tumbled the gold out of the balance with indignation, and turning to the Spaniards, told them, that ſince they valued gold ſo very highly, he would conduct them to a country where the moſt common utenſils were made of that metal. The Spaniards eagerly catched at this hint; and upon further queſtioning the cacique, were informed, that at the diſtance of ſix days journey, towards the ſouth, from the place where they were at that time, they ſhould diſcover another ocean, near which this deſirable country was ſituated; but if they intended to attack that powerful ſtate, they muſt aſſemble a much greater number of forces than had hitherto appeared on the continent.

Balboa was tranſported at the news. He immediately concluded, that the ocean mentioned by the cacique was that which Columbus had ſo long ſought for in vain, and that the rich territory deſcribed to him muſt be part of the Eaſt Indies. He was therefore impatient till he ſhould arrive at that happy country, in compariſon with the diſcovery of which all former exploits almoſt vaniſhed into nothing. In order therefore to procure a force ſufficient to enſure ſucceſs in his enterpriſe, he firſt ſecured the friendſhip of the neighbouring caciques, and then diſpatched ſome of his officers to Hiſpaniola, with a large quantity of gold as a proof of his paſt ſucceſs, and an earneſt of what he expected. By this means he ſecured the friendſhip of the governor, and procured a conſiderable reinforcement. But though he now imagined himſelf ſufficiently ſtrong to attempt the diſcovery, there were ſtill prodigious difficulties to be ſurmounted. The iſthmus of Darien, though not above 60 miles in breadth, has a chain of lofty mountains running through its whole extent. Being ſituated between two vaſt oceans, the Atlantic and Pacific, the climate is exceſſively moiſt, inſomuch that it rains for two-thirds of the year. In conſequence of this the valleys are marſhy, and ſo frequently overflowed, that the inhabitants find it neceſſary in ſome places to build their houſes upon trees, in order to be elevated at ſome diſtance from the damp ſoil, and the odious reptiles engendered in the waters. There are alſo many large rivers very difficult to be croſſed; and as the country at that time was only inhabited by a few wandering ſavages, the enterpriſe of Balboa is looked upon as the moſt difficult that had been undertaken by any Spaniſh adventurer.

2
Difficulties they had to overcome.

On this arduous taſk Balboa ſet out on the 1ſt day of September 1513, about the time that the periodical rains begin to abate. He had only 190 Spaniards along with him; but all of them were hardy veterans, inured to the climate of America, and very much attached to their leader. A thouſand Indians attended in order to carry their proviſions and other neceſſaries; and they had along with them ſome of thoſe fierce dogs ſo terrible to the natives of America.

Balboa proceeded by ſea, and without difficulty, to the territories of a cacique whoſe friendſhip he had gained; but as ſoon as he began to advance into the interior parts of the country, he met with all the difficulties above mentioned. Some of the caciques alſo, at his approach, fled with all their people to the mountains, carrying off or deſtroying whatever could afford ſubſiſtence to an army. Others collected their force in order to oppoſe him: however Balboa continued unmoved in ſpite of all difficulties; and at laſt, after a moſt painful journey of 25 days, he arrived at the South Sea; when, with the moſt extravagant tranſports of joy, he went into it up to the middle, and took poſſeſſion of the ocean in his maſter's name, vowing to defend it againſt all the enemies of Spain.

3
Balboa firſt gets a ſight of the South Sea.

That part of the South Sea which Balboa now diſcovered, he called the *Gulf of St Michael*; which name it ſtill retains, and is ſituated to the eaſt of Panama. From ſome of the neighbouring caciques he extorted proviſions and gold by force; others ſent him preſents voluntarily; and he had the ſatisfaction to hear, that the adjacent coaſts abounded with pearl-oyſters. The inhabitants were alſo unanimous in declaring, that there was to the ſouthward a very rich and populous country, where the people had tame animals, which they endeavoured to deſcribe to him, meaning the Peruvian ſheep. But however impatient he might be to viſit this empire, he conſidered it as highly improper to venture thither with a handful of men exhauſted by labour and diſeaſe. He therefore led back his followers to Santa Maria, in order to refreſh them after their fatigues; and from thence he ſent an account to the court of Spain of the important diſcovery he had made, demanding a reinforcement of 1000 men, in order to conquer the country he had newly diſcovered. But here his hopes were all blaſted at once. The king indeed determined to proſecute the diſcovery, but refuſed to continue Balboa in his government, appointing Pedrarias Davila to ſuperſede him, and giving him the command of 15 ſtout veſſels, with 1200 ſoldiers, to enſure his ſucceſs.

4
He is deprived of his command;

Balboa, though much mortified by his diſgrace, ſubmitted to the king's pleaſure without repining. It was not long, however, before he met with an additional misfortune; the new governor tried him for ſome pretended irregularities committed before his arrival, and fined him of almoſt all he was worth. In the mean time the Spaniards, paying no regard to the treaties concluded by Balboa with the Indians, plundered and deſtroyed all indiſcriminately, inſomuch that the whole country, from the gulph of Darien to the lake Nicaragua, was deſolated. The new comers had alſo arrived at the moſt unlucky time of the year, namely, about the middle of the wet ſeaſon, when the exceſſive rains produced the moſt violent and fatal diſeaſes. To this was joined an extreme ſcarcity of proviſions; ſo that in the ſpace of a month above 600 Spaniards periſhed in the utmoſt miſery.

Balboa failed not to ſend violent remonſtrances to Spain againſt the conduct of the new governor; and he, on the other hand, accuſed his antagoniſt of having deceived the king by falſe accounts of the country, and magnifying his own exploits beyond meaſure. At laſt the king, ſenſible of his error in ſuperſeding Balboa, appointed him adelantado, or lieutenant-governor of the countries on the South Sea, with very extenſive privileges and authority; enjoining Pedrarias to ſupport him in all his enterpriſes, and to conſult with him in every thing which he himſelf undertook. It was impoſſible, however, to extinguiſh the envy of Pedrarias; and therefore, though a reconciliation took place in appearance, even ſo far, that Pedrarias agreed to give his daughter in marriage to Balboa, yet he ſoon after had him condemned and executed on pretence of diſloyalty, and an intention to revolt from the king.

5
And put to death.

On the death of Balboa, the thoughts of conquering Peru were for a time laid aſide; however it ſtill remained an object of deſire to all the Spaniſh adventurers in America. Accordingly ſeveral armaments were fitted out with a deſign to explore and take poſſeſſion of the countries to the eaſt of Panama; but, either through the difficulties which attended the undertaking itſelf, or the bad conduct of the adventurers, all of them proved unſucceſsful, until at laſt it became a general opinion, that Balboa's ſcheme had been entirely viſionary.

6
A new expedition ſet on foot.

Still, however, there were three perſons ſettled at Panama, on whom the common opinion made ſo little impreſſion, that they determined to go in queſt of this country, looked upon to be chimerical by the generality of their neighbours. Their names were *Franciſco Pizarro*, *Diego de Almagro*, and *Hernando Luque*. Pizarro and Almagro were ſoldiers of fortune, and Luque was an eccleſiaſtic, who acted both as prieſt and ſchoolmaſter at Panama. Their confederacy was authoriſed by Pedrarias governor of Panama; and each engaged to employ his whole fortune in the adventure. Pizarro, being the leaſt wealthy of the three, engaged to take upon himſelf the greateſt ſhare of the fatigue and danger, and to command in perſon the armament which was to go firſt upon the diſcovery. Almagro offered to conduct the ſupplies of proviſions and reinforcements of troops which might be neceſſary; and Luque was to remain at Panama, in order to negotiate with the governor, and to ſuperintend whatever was carrying on for the general intereſt.

7
Meets with bad ſucceſs at firſt.

In 1524, Pizarro ſet ſail from Panama with a ſingle veſſel of ſmall burthen, and 112 men; and ſo little was he or his countrymen at that time acquainted with the climate of America, that the moſt improper ſeaſon of the whole year was choſen for his departure; the periodical winds, which were then ſet in, being directly oppoſite to the courſe which he propoſed to ſteer. The conſequence of this was, that after beating about for 70 days, with much danger and fatigue, he had advanced ſcarce as far to the ſouth-eaſt as a ſkilful navigator will now make in three days. He touched at ſeveral places of Terra Firma; but finding that country exceedingly inhoſpitable and unhealthy, he was obliged to retire to Chuchama, oppoſite to the Pearl Iſlands, where he hoped to receive ſome reinforcements from Panama. Here he was found by Almagro, who had ſet out in queſt of him with a reinforcement of 70 men, and had ſuffered diſtreſſes very much reſembling thoſe of Pizarro himſelf. In particular, he had loſt an eye in a combat with the Indians. However, he had advanced as far as the river of St Juan in the province of Popayan, where the country ſhewing a better aſpect, and the inhabitants more friendly, our projectors again began to indulge themſelves in hopes, and determined by no means to abandon their ſcheme.

Almagro returned to Panama, in hopes of recruiting their ſhattered troops. But the bad accounts of the ſervice gave his countrymen ſuch an unfavourable idea of it, that Almagro could levy no more than 80 men, and theſe with great difficulty. Slender as this reinforcement was, however, the adventurers did not heſitate at renewing their enterpriſe. The diſaſters and diſappointments they met with in this new attempt, were ſcarce inferior to thoſe they had already experienced, when part of the armament at laſt reached the bay of St Matthew on the coaſt of Quito, and landed at Tacamez, to the ſouth of the River of Emeralds, where they met with a more fertile and champaign country than any they had yet ſeen; the natives alſo were more civilized, and clothed in garments of cotton or woolen ſtuff, adorned with trinkets of gold and ſilver. But notwithſtanding theſe favourable appearances, Pizarro did not think fit to attack ſuch a powerful empire with an handful of ſoldiers already exhauſted; and therefore retired to a ſmall iſland called *Gallo*, with part of the troops; from whence he diſpatched Almagro to Panama, in hopes of obtaining a reinforcement.

The reception which Almagro met with was by no means agreeable. Some of the adventurers had informed their friends of the many dangers and loſſes which they had ſuſtained; which not only diſheartened people from engaging in the ſervice, but weighed ſo much with Pedro de los Rios, the ſucceſſor of Pedrarias, that he prohibited the raiſing of new recruits, and even diſpatched a veſſel to bring home Pizarro and his companions from the iſland of Gallo. Almagro and Luque, though much mortified with this diſappointment, privately adviſed Pizarro not to relinquiſh an enterpriſe on which they had built all their hopes. He therefore poſitively refuſed to obey the orders of the governor, and employed all his addreſs in perſuading his men not to abandon him. But the calamities to which they had been expoſed had ſuch an effect upon them, that when he drew a line upon the ſand with his ſword, telling ſuch as wiſhed to return that they might paſs over it, only 13 had reſolution to remain with him.

8
Pizarro a-
andoned
y all his
en but 13.

Pizarro with his little troop now fixed their reſidence on the iſland of Gorgona, which they conſidered as a ſafer retreat than Gallo, as being farther removed from the coaſt and uninhabited, ſo that they might with the greater ſecurity wait for ſupplies. Here, they continued five months in the moſt unwholeſome climate imaginable, and at laſt had come to a reſolution of committing themſelvs to ſea on a float, when a veſſel arrived from Panama to their relief. This was the effect of the continued ſolicitations of Almagro and Luque; who, though they could not prevail upon the governor to favour the undertaking, had ſucceeded ſo far as to induce him to ſend a ſmall veſſel to the relief of Pizarro and his unfortunate aſſociates. However, the more effectually to ſhew his diſapprobation of Pizarro's ſcheme, the governor refuſed to allow one land-man to go on board of the ſhip which he ſent.—The hopes of the adventurers, however, were now again revived, and Pizarro eaſily induced them to reſume their ſcheme. Inſtead of returning to Panama, therefore, they ſailed to the ſouth-eaſt, and in 20 days after the diſcovery of Gorgona they diſcovered the coaſt of Peru. Having touched at ſome places of leſs note, they at length arrived at Tumbez, remarkable for its ſtately temple, and a palace of the Incas, or ſovereigns of the country. Here, they found that what had been told them concerning the riches of the country was true; not only ornaments and ſacred veſſels being made of gold and ſilver, but even ſuch as were for common uſe. Yet to attempt the conqueſt of this opulent empire with their ſlender force, would have been madneſs; they contented themſelves therefore with viewing it, procuring two of the beaſts of burthen called *Llamas*, to which they gave the name of ſheep, ſome veſſels of gold and ſilver, and two young men, whom they propoſed to inſtruct in the Caſtilian language. With theſe Pizarro arrived at Panama in the year 1527, near three years after he had ſet out from that place in his expedition.

9
oes on
ith his
heme at
l adven-
res.

10
ſtory of
Incas of
ru.

The empire of Peru thus diſcovered, is ſaid to have been originally poſſeſſed by independent tribes, juſtly reckoned among the moſt ſavage even in America; living more like wild beaſts than men. For ſeveral ages they lived in this manner, when ſuddenly there appeared on the banks of a lake called *Titiaca*, a man and woman of majeſtic form, and cloathed in decent garments. They declared themſelves to be the children of the ſun, ſent by their beneficent parent to inſtruct and reclaim mankind.

The names of theſe two extraordinary perſonages were *Manco Capac* and *Mama Ocollo*. At their perſuaſion, ſeveral of the diſperſed ſavages united, and, receiving their commands as heavenly injunctions, followed them to Cuzco, where they ſettled, and began to lay the foundations of a city. Manco Capac inſtructed the men in agriculture, and other uſeful arts; while Mama Ocollo taught the women to ſpin and weave; after which Manco turned his attention towards the introducing of proper laws and regulations into his new ſtate.

Thus, according to the Indian tradition, was founded the empire of the Incas, or lords of Peru. At firſt its extent was ſmall, the territory of Manco Capac reaching not above eight leagues from Cuzco his capital. Within theſe narrow limits, however, he exerciſed the moſt perfect deſpotiſm, and the ſame was maintained by his ſucceſſors, all of whom were not only obeyed as monarchs, but reverenced as deities. Their blood was held to be ſacred, and, by prohibiting intermarriages with the people, was never contaminated by mixing with that of any other race. The family, thus ſeparated from the reſt of the nation, was diſtinguiſhed by peculiarities in dreſs and ornaments, which it was unlawful for others to aſſume. Among the Peruvians, however, it is ſaid, that this high degree of veneration was made uſe of by the monarchs only to promote the good of their ſubjects. If we may believe the accounts given by their countrymen, the Peruvian monarchs extended their empire not with a view to increaſe their own power and wealth, but from a deſire of diffuſing the bleſſings of civilization, and the knowledge of the arts which they poſſeſſed, among the barbarous people whom they reduced, and, during a ſucceſſion of 12 monarchs, not one deviated from this character.

11
Progreſs of the Spaniards facilitated by a civil war among the natives.

When the Spaniards firſt viſited this country, they found it agitated by a civil war. Huana Capac, the 12th monarch from the founder of the ſtate, was ſeated on the throne; who is repreſented as a prince no leſs conſpicuous for his abilities in war, than for his pacific virtues. By him the kingdom of Quito was ſubdued, which almoſt doubled the extent of the dominions and power of the Peruvian empire. Notwithſtanding the ancient and fundamental law againſt polluting the blood of the Inca with any foreign alliance, Huana married the daughter of the conquered monarch, by whom he had a ſon named *Atahualpa*, commonly written *Atabalipa*, to whom, at his death in 1529, he left the kingdom of Quito, beſtowing the reſt of his dominions upon Huaſcar his eldeſt ſon by a mother of the royal race. This produced a civil war, in which Atabalipa proved victorious, and afterwards attempted to ſecure himſelf on the throne by putting to death all the deſcendants of Mingo Capac, ſtyled *the children of the Sun*, whom he could ſeize either by force or ſtratagem; however, from a political motive, he ſpared the life of his rival Huaſcar, who had the miſfortune to be taken priſoner in an engagement, that, by iſſuing out orders in his name, he might more eaſily eſtabliſh his own authority, and cover the illegality of his birth.

This conteſt had ſo much engaged the attention of the Peruvians, that they never once attempted to check the progreſs of the Spaniards. It was ſome time, however, before Pizarro was informed of this conteſt, ſo much in his favour. The firſt intelligence which he received of it was a meſſage from Huaſcar, aſking his aſſiſtance againſt Atabalipa, whom he repreſented as a rebel and an uſurper. Pizarro perceived the importance of the intelligence, and therefore determined to puſh forward, while inteſtine diſcord put it out of the power of the Peruvians to attack him with their whole force. Being obliged to divide his troops, in order to leave a garriſon in St Michael, which might ſerve for a place of retreat in caſe of a diſaſter, he began his march with only 62 horſemen and 102 foot-ſoldiers, 20 of whom were armed with croſs-bows, and only three with muſkets. He directed his courſe towards Caxamalca, a ſmall town at the diſtance of 12 days march from St Michael, where Atabalipa was encamped with a conſiderable body of troops. Before he had proceeded far, an officer diſpatched by the Inca met him with a valuable preſent from that prince, accompanied with a proffer of his alliance, and his aſſurances of a friendly reception at Caxamalca. Pizarro, according to the uſual artifice of his countrymen in America, pretended to come as the ambaſſador of a very powerful monarch, and declared that he was now advancing with intention to offer Atabalipa his aid againſt thoſe enemies who diſputed his title to the throne.

As the object of the Spaniards in entering their country was altogether incomprehenſible to the Peruvians, they had formed various conjectures concerning it, without being able to decide whether they ſhould conſider their new gueſts as beings of a ſuperior nature, who had viſited them from ſome beneficent motive, or as formidable avengers of their crimes, and enemies to their repoſe and liberty. The continual profeſſions of the Spaniards, that they came to enlighten them with the knowledge of truth, and lead them in the way of happineſs, favoured the former opinion; the outrages which they committed, their rapaciouſneſs and cruelty, were awful confirmations of the latter. While in this ſtate of uncertainty, Pizarro's declaration of his pacific intentions ſo far removed all the Inca's fears, that he determined to give him a friendly reception. In conſequence of this reſolution, the Spaniards were allowed to march in tranquillity acroſs the ſandy deſart between St Michael and Motupè, where the moſt feeble effort of an enemy, added to the unavoidable diſtreſſes which they ſuffered in paſſing through that comfortleſs region, muſt have proved fatal to them. From Motupè they advanced towards the mountains which encompaſs the low country of Peru, and paſſed through a defile ſo narrow and inacceſſible, that a few men might have defended it againſt a numerous army. But here likewiſe, from the ſame inconſiderate credulity of the Inca, the Spaniards met with no oppoſition, and took quiet poſſeſſion of a fort erected for the ſecurity of that important ſtation. As they now approached near to Caxamalca, Atabalipa renewed his profeſſions of friendſhip; and, as an evidence of his ſincerity, ſent them preſents of greater value than the former.

On entering Caxamalca, Pizarro took poſſeſſion of a large court, on one ſide of which was a houſe which the Spaniſh hiſtorians call a palace of the Inca, and on the other a temple of the ſun, the whole ſurrounded with a ſtrong rampart or wall of earth. When he had poſted his troops in this advantageous ſtation, he diſpatched Hernando Soto, and his brother Ferdinand, to the camp of Atabalipa, which was about a league diſtant from the town. He inſtructed them to confirm the declaration which he had formerly made of his pacific diſpoſition, and to deſire an interview with the Inca, that he might explain more fully the intention of the Spaniards in viſiting his country. They were treated with all the reſpectful hoſpitality uſual among the Peruvians in the reception of their moſt cordial friends, and Atabalipa promiſed to viſit the Spaniſh commander next day in his quarters. The decent deportment of the Peruvian monarch, the order of his court, and the reverence with which his ſubjects approached his perſon and obeyed his commands, aſtoniſhed thoſe Spaniards, who had never met in America with any thing more dignified than the petty cacique of a barbarous tribe. But their eyes were ſtill more powerfully attracted by the vaſt profuſion of wealth which they obſerved in the Inca's camp. The rich ornaments worn by him and his attendants, the veſſels of gold and ſilver in which the repaſt offered to them was ſerved up, the multitude of utenſils of every kind formed of thoſe precious metals, opened proſpects far exceeding any idea of opulence that a European of the 16th century could form.

On their return to Caxamalca, while their minds were yet warm with admiration and deſire of the wealth which they had beheld, they gave ſuch a deſcription of it to their countrymen, as confirmed Pizarro in a reſolution which he had already taken. From his own obſervation of American manners during his long ſervice in the New World, as well as from the advantages which Cortes had derived from ſeizing Montezuma, he knew of what conſequence it was to have the Inca in his power. For this purpoſe, he formed a plan as daring as it was perfidious. Notwithſtanding the character he had aſſumed of an ambaſſador from a powerful monarch, who courted an alliance with the Inca, and in violation of the repeated offers which he had made to him of his own friendſhip and aſſiſtance, he determined to avail himſelf of the unſuſpicious ſimplicity with which Atabalipa relied on his profeſſions, and to ſeize his perſon during the interview to which he had invited him. He prepared for the execution of his ſcheme with the ſame deliberate arrangement, and with as little compunction, as if it had reflected no diſgrace on himſelf or his country. He divided his cavalry into three ſmall ſquadrons, under the command of his brother Ferdinand, Soto, and Benalcazar; his infantry was formed into one body, except 20 of moſt tried courage, whom he kept near his own perſon to ſupport him in the dangerous ſervice which he reſerved for himſelf; the artillery, conſiſting of two field-pieces, and the croſsbow men, were placed oppoſite to the avenue by which Atabalipa was to approach. All were commanded to keep within the ſquare, and not to move until the ſignal for action was given.

12
Perfidious ſcheme of Pizarro to ſeize the Inca.

Early in the morning the Peruvian camp was all in motion. But as Atabalipa was ſolicitous to appear with the greateſt ſplendour and magnificence in his firſt interview with the ſtrangers, the preparations for this were ſo tedious, that the day was far advanced before he began his march. Even then, leſt the order of the proceſſion ſhould be deranged, he moved ſo ſlowly, that the Spaniards became impatient and apprehenſive that ſome ſuſpicion of their intention might be the cauſe of this delay. In order to remove this, Pizarro diſpatched one of his officers with freſh aſſurances of his friendly diſpoſition. At length the Inca approached. Firſt of all appeared 400 men in an uniform dreſs, as harbingers to clear the way before him. He himſelf, ſitting on a throne or couch, adorned with plumes of various colours, and almoſt covered with plates of gold and ſilver enriched with precious ſtones, was carried on the ſhoulders of his principal attendants. Behind him came ſome chief officers of his court, carried in the ſame manner. Several bands of ſingers and dancers accompanied this cavalcade; and the whole plain was covered with troops, amounting to more than 30,000 men.

As the Inca drew near the Spaniſh quarters, father Vincent Valverde, chaplain to the expedition, advanced with a crucifix in one hand, and a breviary in the other, and in a long diſcourſe explained to him the doctrine of the creation, the fall of Adam, the incarnation, the ſufferings and reſurrection of Jeſus Chriſt, the appointment of St Peter as God's vicegerent on earth, the tranſmiſſion of his apoſtolical power by ſucceſſion to the popes, the donation made to the king of Caſtile by pope Alexander of all the regions in the New World. In conſequence of all this, he required Atabalipa to embrace the Chriſtian faith, to acknowledge the ſupreme juriſdiction of the pope, and to ſubmit to the king of Caſtile as his lawful ſovereign; promiſing, if he complied inſtantly with this requiſition, that the Caſtilian monarch would protect his dominions, and permit him to continue in the exerciſe of his royal authority; but if he ſhould impiouſly refuſe to obey this ſummons, he denounced war againſt him in his maſter's name, and threatened him with the moſt dreadful effects of his vengeance.

This ſtrange harangue, unfolding deep myſteries, and alluding to unknown facts, of which no power of eloquence could have conveyed at once a diſtinct idea to an American, was ſo lamely tranſlated by an unſkilful interpreter, little acquainted with the idiom of the Spaniſh tongue, and incapable of expreſſing himſelf with propriety in the language of the Inca, that its general tenor was altogether incomprehenſible to Atabalipa. Some parts in it of more obvious meaning, filled him with aſtoniſhment and indignation. His reply, however, was temperate. He began with obſerving, that he was lord of the dominions over which he reigned by hereditary ſucceſſion; and added, that he could not conceive how a foreign prieſt ſhould pretend to diſpoſe of territories which did not belong to him; that if ſuch a prepoſterous grant had been made, he, who was the rightful poſſeſſor, refuſed to confirm it; that he had no inclination to renounce the religious inſtitutions eſtabliſhed by his anceſtors; nor would he forſake the ſervice of the ſun, the immortal divinity whom he and his people revered, in order to worſhip the God of the Spaniards, who was ſubject to death; that with reſpect to other matters contained in his diſcourſe, as he had never heard of them before, and did not now underſtand their meaning, he deſired to know where he had learned things ſo extraordinary. "In this book," anſwered Valverede, reaching out to him his breviary. The Inca opened it eagerly; and turning over the leaves, lifted it to his ear: "This," ſays he, "is ſilent; it tells me nothing;" and threw it with diſdain to the ground. The enraged monk, running towards his countrymen, cried out, "To arms, Chriſtians, to arms; the word of God is inſulted; avenge this profanation on thoſe impious dogs."

Pizarro, who, during this long conference, had with difficulty reſtrained his ſoldiers, eager to ſeize the rich ſpoils of which they had now ſo near a view, immediately gave the ſignal of aſſault. At once the martial muſic ſtruck up, the cannon and muſkets began to fire, the horſe ſallied out fiercely to the charge, the infantry ruſhed on ſword in hand. The Peruvians, aſtoniſhed at the ſuddenneſs of an attack which they did not expect, and diſmayed with the deſtructive effects of the fire-arms, and the irreſiſtible impreſſion of the cavalry, fled with univerſal conſternation on every ſide, without attempting either to annoy the enemy, or to defend themſelves. Pizarro, at the head of his choſen band, advanced directly towards the Inca; and though his nobles crowded around him with officious zeal, and fell in numbers at his feet, while they vied one with another in ſacrificing their own lives, that they might cover the ſacred perſon of their ſovereign, the Spaniards ſoon penetrated to the royal ſeat; and Pizarro ſeizing the Inca by the arm, dragged him to the ground, and carried him as a priſoner to his quarters. The fate of the monarch increaſed the precipitate flight of his followers. The Spaniards purſued them towards every quarter, and, with deliberate and unrelenting barbarity, continued to ſlaughter wretched fugitives, who never once offered at reſiſtance. The carnage did not ceaſe until the cloſe of day. Above 4000 Peruvians were killed. Not a ſingle Spaniard fell, nor was one wounded but Pizarro himſelf, whoſe hand was ſlightly hurt by one of his own ſoldiers, while ſtruggling eagerly to lay hold on the Inca.

13
Atabalipa ſeized by Pizarro.

The plunder taken on this occaſion was immenſe, but the Spaniards were ſtill unſatisfied; which being obſerved by the Inca, he endeavoured to apply himſelf to their ruling paſſion, avarice, in order to obtain his liberty; and therefore offered ſuch a ranſom as aſtoniſhed them, even after all they knew concerning the opulence of the country. The apartment in which he was confined was 22 feet in length and 16 in breadth; and all this ſpace he engaged to fill with veſſels of gold as high as he could reach. This propoſal was eagerly caught by Pizarro, and a line was drawn upon the walls to mark the ſtipulated height.

14
He offers an immenſe ſum for his liberty.

Atabalipa, charmed with the thoughts of liberty, immediately ſet about performing his part of the agreement, and diſpatched meſſengers into all parts of the empire, in order to collect the immenſe quantity of gold which he had promiſed; and though the unfortunate monarch was now in the hands of his enemies, ſuch was the veneration which his ſubjects had for him, that his orders were obeyed with as great alacrity as though he had been at full liberty; while he, in the mean time, flattering himſelf with the hopes of being ſoon releaſed, made no preparations for expelling the invaders from his dominions.

In a ſhort time, Pizarro received intelligence that

Almagro was arrived at St Michael with a reinforcement equal to the force he had with him. This was a matter of great joy to the Spaniards, and no ſmall vexation to Atabalipa, who now conſidered his kingdom as in danger of being totally over-run by theſe ſtrangers, whoſe force he neither knew, nor the means they had of tranſporting themſelves. For this reaſon he determined to put his brother Huaſcar to death, leſt he ſhould join the ſtrangers againſt him. To this he was the rather inclined, as he had got information that the captive prince had been making applications to them, and had offered them a much larger ſum than what was ſtipulated for the Inca's ranſom; and in conſequence of this determination the unfortunate prince loſt his life.

In the mean time, the Indians daily arrived at Caxamalca with vaſt quantities of treaſure; the ſight of which ſo much inflamed the Spaniards, that they inſiſted upon an immediate diviſion: and this being complied with, there fell to the ſhare of each horſeman 8000 peſos, at that time not inferior to the value of as many pounds ſterling in the preſent century, and half as much to each foot-ſoldier, Pizarro and his officers receiving ſhares proportionable to their dignity. A fifth part was reſerved for the emperor, together with ſome veſſels of curious workmanſhip as a preſent. In conſequence of this immenſe acquiſition of wealth, many of the Spaniards became clamorous for their diſcharge; which was readily granted by their general, as well knowing that the diſplay of their riches would not fail to allure adventurers more hardy, though leſs opulent, to his ſtandard.

15
Pizarro reſolves to put the Inca to death.

After this diviſion of the ſpoil, Atabalipa was very importunate with Pizarro in order to recover his liberty; but the Spaniard, with unparallelled treachery and cruelty, had now determined to put him to death. To this he was urged by Almagro's ſoldiers, who, though they had received an equal ſhare with the reſt, were ſtill unſatisfied. The Inca's ranſom had not been completed; and they were apprehenſive, that whatever ſums might afterwards be brought in, the troops of Pizarro would appropriate them to themſelves as part of that ranſom. They inſiſted with Pizarro, therefore, to put him to death, that all the adventurers might for the future be on an equal footing. Accounts were likewiſe received that troops were aſſembling in the remote provinces of the empire, which Pizarro ſuſpected to be done by the Inca's orders. Theſe accounts were heightened by one Philippillo an Indian interpreter, who had conceived a paſſion for one of the unhappy monarch's wives; and for that reaſon wiſhed to have him put to death. Atabalipa himſelf, too, had the misfortune to haſten his own ruin by his conceiving a contemptuous notion of Pizarro, which he had not the precaution to conceal. He had long admired the European arts of reading and writing, and wiſhed much to know whether he ſhould regard it as a natural or acquired talent. In order to determine this, he deſired one of the ſoldiers who guarded him to write the name of God upon the nail of his thumb. This he ſhewed to ſeveral Spaniards ſucceſſively, aſking its meaning; and, to his ſurpriſe, they all returned the ſame anſwer. At length Pizarro entered; and, on preſenting it to him, he bluſhed, and was obliged to own his ignorance; which inſpired the Inca with the contemptuous notion of him abovementioned.

16
Atabalipa accuſed and condemned.

In order, however, to give ſome ſhew of juſtice to ſuch a deteſtable action, and that he might be exempted from ſtanding ſingly as the perpetrator, Pizarro reſolved to accuſe the Inca of ſome capital crime, and inſtitute a court of judicature for the purpoſe of trying him. For this purpoſe, he appointed himſelf and Almagro, with two aſſiſtants, as judges, with full powers to acquit or condemn: an attorney-general was named to carry on the proſecution in the king's name; counſellors were choſen to aſſiſt the priſoner in his defence; and clerks were ordained to record the proceedings of court. Before this ſtrange tribunal, a charge was exhibited ſtill more amazing. It conſiſted of various articles: that Atabalipa, though a baſtard, had diſpoſſeſſed the lawful owner of the throne, and uſurped the regal power; that he had put his brother and lawful ſovereign to death; that he was an idolater, and had not only permitted, but commanded the offering up of human ſacrifices; that he had a great number of concubines; that ſince his impriſonment, he had waſted and embezzled the royal treaſures, which now belonged of right to the conquerors; and that he had excited his ſubjects to take up arms againſt the Spaniards. On theſe heads of accuſation they proceeded to try the ſovereign of a great empire, over whom they had no juriſdiction. To all theſe charges the Inca pleaded not guilty. With reſpect to the death of his brother, he alleged, that the Spaniards could take no cognizance of the fact. With regard to the taxes which he had levied, and the wars he had carried on, they were nothing to the Spaniards; and as to the conſpiracy againſt the Spaniards, he utterly denied it. He called heaven and earth to witneſs the integrity of his conduct, and how faithfully he had performed his engagements, and the perfidy of his accuſers. He deſired to be ſent over to Spain to take his trial before the emperor; but no regard was paid to his intreaties; he was condemned to be burnt alive; which cruel ſentence was mitigated, as a great favour, to ſtrangling; and the unhappy monarch was executed without mercy.

17
And ſtrangled.

18
A general revolt of the Peruvians.

The death of the Inca was followed by a revolution in the Spaniſh affairs, who now became generally odious. Hideous cries were ſet up by his women as the funeral proceſſion paſſed by their apartment: many offered to bury themſelves alive with him; and on being hindered, ſtrangled themſelves out of grief and vexation. The whole town of Caxamalca was filled with lamentation, which quickly extended itſelf over the whole kingdom. Friends and enemies accuſed the Spaniards of inhumanity and treachery. Loads of gold that were coming to Caxamalca by order of the deceaſed Inca were now ſtopped; and the loſs of the treaſure was the firſt unfortunate conſequence which the Spaniards felt from their late iniquitous conduct. The two factions of Indians united againſt Pizarro; and many of the Spaniards not only exclaimed againſt the cruelty of the invaders, but would even have mutinied, had not a ſenſe of the impending danger kept them quiet. At Cuzco the friends of the emperor Huaſcar proclaimed Mango Capac the legitimate brother of the late Inca, determining to ſupport him to the laſt againſt all the machinations of his enemies.

Pizarro, in the mean time, ſet up Taparpa, the ſon of Atabalipa, cauſing him to be treated with all the honours due to an emperor. Immediately he ſet out for Cuzco, the gaining of which was abſolutely neceſſary for his deſign. An army of Indians occupied the paſſes, and reſolved to diſpute his progreſs. The conteſt, however, was ſoon decided; the Spaniſh cavalry bore down every thing before them, and great numbers of Indians were ſlain. The conquerors gained a conſiderable booty; and Pizarro diſpatched Almagro to reduce Cuzco, while he himſelf founded a new colony in the fruitful valley of Xauna; which, however, was not permanent, being afterwards removed to the place where Lima now ſtands.

While Pizarro was thus employed, another commander, named *Ferdinando Soto*, was detached with 60 horſe to make the beſt of his way to Cuzco, and clear the road for the march of the remainder of the army. He was oppoſed by a formidable collection of Indians, who had fortified themſelves in order to defend a paſs againſt him: for which reaſon, fearing leſt his ſtrength might be unequal, he ſent a meſſage to Pizarro, deſiring that the Inca might join him, thinking that his preſence would awe the Peruvians, and prevent the further effuſion of blood; but his expectations were fruſtrated by the death of the Inca, which happened about this time; ſo that there was now a neceſſity for having recourſe to arms; for as the Spaniards ſet up no perſon in his room, the title of Mango Capac was univerſally acknowledged.

In the mean time, a new ſupply of ſoldiers arriving from Spain, Benalcazar, governor of St Michael, undertook an expedition againſt Quito, where, according to the report of the natives, Atabalipa had left the greateſt part of his treaſure. He accompliſhed his purpoſe with very great difficulty, having a country covered with rocks and mountains to paſs, and being oppoſed by large bodies of the natives. But when he got poſſeſſion of the city, to his extreme mortification, he found that the inhabitants had carried off all their gold and ſilver; for they being now acquainted with the ruling paſſion of the Spaniards, had taken care to diſappoint it, by removing the treaſures which they knew very well had been the cauſe of the expedition.

19
Chili invaded by Alvarado.

About the ſame time, Alvarado, governor of Guatimala, invaded the province of Chili. In this expedition his troops endured ſuch hardſhips, and ſuffered ſo much from the cold among the Andes, that a fifth part of the men and all the horſes died, and at the ſame time the reſt were ſo much diſpirited and emaciated, that they became quite unfit for ſervice. What was worſt of all, when they had arrived at the end of their journey, they met with a body of Spaniards drawn up in hoſtile array to oppoſe them. Theſe had been ſent againſt him by Pizarro, who claimed Chili as part of his juriſdiction, and were now joined by Benalcazar, with the troops under his command. Alvarado, however, advanced boldly to the attack; but, on the interpoſition of ſome moderate men in each party, the difference was accommodated; Alvarado engaged to return to his government, upon his being paid 100,000 peſos to defray the expence of his armament; however, moſt of his followers remained in the country, and enliſted in the ſervice of Pizarro.

30
He is obliged by Pizarro to abandon the enterpriſe.

In the mean time Ferdinand Pizarro, the brother of the general, had landed in Spain, where he produced ſuch immenſe quantities of gold and ſilver as aſtoniſhed the court, even after all they had ſeen of the wealth of their new-diſcovered territories. The general's authority was confirmed to him with new powers and privileges, and the addition of 70 leagues extending along the coaſt, to the ſouthward of the territory granted in his former patent. Almagro had the title of *adelantado* or *governor* conferred upon him, with juriſdiction over 200 leagues of a country lying ſouthward from the province allotted to Pizarro; he himſelf was made a knight of the order of St Jago.

21
Honours conferred on Pizarro by the court of Spain.

Of theſe tranſactions ſome accounts were received at Peru before the arrival of Ferdinand Pizarro himſelf; and no ſooner did Almagro hear that he had obtained the royal grant of an independent government, than, pretending that Cuzco, the capital of all Peru, lay within his juriſdiction, he attempted to ſeize it. Pizarro was no leſs ready to oppoſe him; and a very dangerous civil war was about to take place, when the quarrel was made up, on condition that Almagro ſhould attempt the conqueſt of Chili; and if he did not find there an eſtabliſhment equivalent to his expectations, Pizarro ſhould yield up to him part of Peru.

By this reconciliation Pizarro was left at liberty to ſettle the internal policy of his province, which, though little qualified for a legiſlator, he attempted, by dividing the country into various diſtricts, appointing magiſtrates to preſide in each, and eſtabliſhing ſuch regulations concerning the adminiſtration of juſtice, the royal revenue, &c. as occurred to him. The ſeat of government he removed from Cuzco to Lima, which he named *Ceudad des los Reyes*, and which name it ſtill retains among the Spaniards in all legal and formal deeds. Its other name, *Lima*, is a corruption of *Rimac*, the name of the valley in which the city ſtands.

In the mean time Almagro had ſet out on his expedition to Chili; the event of which has been related under the article CHILI; and while he was thus employed, Pizarro encouraged ſome of his moſt diſtinguiſhed officers to invade thoſe provinces of the empire which had not yet been viſited by the Spaniards. This he did with a view to keep them employed, and prevent tumults; but it was attended with very terrible conſequences. No ſooner did Mango Capac the Inca perceive the ſecurity of the Spaniards in thus dividing their forces, than he ſeized the opportunity of making one vigorous effort to redreſs the wrongs of himſelf and his countrymen, and expel the invaders, who had tyrannized in ſuch a cruel manner. Though ſtrictly guarded by the Spaniards, he found means to communicate his intentions to the chief men of his nation, whom he joined in the year 1536, under pretence of celebrating a feſtival which he had obtained liberty from Pizarro to attend. Upon this the ſtandard of war was immediately erected, and a moſt formidable army, according to the Spaniſh hiſtorians, of 200,000 men collected. Many Spaniards were maſſacred in their habitations, and ſeveral detachments entirely cut off; and while this vaſt army laid ſiege to Cuzco, another formidable body inveſted Lima, and kept the governor cloſely ſhut up. The greateſt effort, however, was

22
A dreadful inſurrection of the Peruvians.

Almagro was arrived at St Michael with a reinforcement equal to the force he had with him. This was a matter of great joy to the Spaniards, and no ſmall vexation to Atabalipa, who now conſidered his kingdom as in danger of being totally over-run by theſe ſtrangers, whoſe force he neither knew, nor the means they had of tranſporting themſelves. For this reaſon he determined to put his brother Huaſcar to death, leſt he ſhould join the ſtrangers againſt him. To this he was the rather inclined, as he had got information that the captive prince had been making applications to them, and had offered them a much larger ſum than what was ſtipulated for the Inca's ranſom; and in conſequence of this determination the unfortunate prince loſt his life.

In the mean time, the Indians daily arrived at Caxamalca with vaſt quantities of treaſure; the ſight of which ſo much inflamed the Spaniards, that they inſiſted upon an immediate diviſion: and this being complied with, there fell to the ſhare of each horſeman 8000 peſos, at that time not inferior to the value of as many pounds ſterling in the preſent century, and half as much to each foot-ſoldier, Pizarro and his officers receiving ſhares proportionable to their dignity. A fifth part was reſerved for the emperor, together with ſome veſſels of curious workmanſhip as a preſent. In conſequence of this immenſe acquiſition of wealth, many of the Spaniards became clamorous for their diſcharge; which was readily granted by their general, as well knowing that the diſplay of their riches would not fail to allure adventurers more hardy, though leſs opulent, to his ſtandard.

15
Pizarro reſolves to put the Inca to death.

After this diviſion of the ſpoil, Atabalipa was very importunate with Pizarro in order to recover his liberty; but the Spaniard, with unparallelled treachery and cruelty, had now determined to put him to death. To this he was urged by Almagro's ſoldiers, who, though they had received an equal ſhare with the reſt, were ſtill unſatiſfied. The Inca's ranſom had not been completed; and they were apprehenſive, that whatever ſums might afterwards be brought in, the troops of Pizarro would appropriate them to themſelves as part of that ranſom. They inſiſted with Pizarro, therefore, to put him to death, that all the adventurers might for the future be on an equal footing. Accounts were likewiſe received that troops were aſſembling in the remote provinces of the empire, which Pizarro ſuſpected to be done by the Inca's orders. Theſe accounts were heightened by one Philippillo an Indian interpreter, who had conceived a paſſion for one of the unhappy monarch's wives; and for that reaſon wiſhed to have him put to death. Atabalipa himſelf, too, had the misfortune to haſten his own ruin by his conceiving a contemptuous notion of Pizarro, which he had not the precaution to conceal. He had long admired the European arts of reading and writing, and wiſhed much to know whether he ſhould regard it as a natural or acquired talent. In order to determine this, he deſired one of the ſoldiers who guarded him to write the name of God upon the nail of his thumb. This he ſhewed to ſeveral Spaniards ſucceſſively, aſking its meaning; and, to his ſurpriſe, they all returned the ſame anſwer. At length Pizarro entered; and, on preſenting it to him, he bluſhed, and was obliged to own his ignorance; which inſpired the Inca with the contemptuous notion of him abovementioned.

16
Atabalipa accuſed and condemned.

In order, however, to give ſome ſhew of juſtice to ſuch a deteſtable action, and that he might be exempted from ſtanding ſingly as the perpetrator, Pizarro reſolved to accuſe the Inca of ſome capital crime, and inſtitute a court of judicature for the purpoſe of trying him. For this purpoſe, he appointed himſelf and Almagro, with two aſſiſtants, as judges, with full powers to acquit or condemn: an attorney-general was named to carry on the proſecution in the king's name; counſellors were choſen to aſſiſt the priſoner in his defence; and clerks were ordained to record the proceedings of court. Before this ſtrange tribunal, a charge was exhibited ſtill more amazing. It conſiſted of various articles: that Atabalipa, though a baſtard, had diſpoſſeſſed the lawful owner of the throne, and uſurped the regal power; that he had put his brother and lawful ſovereign to death; that he was an idolater, and had not only permitted, but commanded the offering up of human ſacrifices; that he had a great number of concubines; that ſince his impriſonment, he had waſted and embezzled the royal treaſures, which now belonged of right to the conquerors; and that he had excited his ſubjects to take up arms againſt the Spaniards. On theſe heads of accuſation they proceeded to try the ſovereign of a great empire, over whom they had no juriſdiction. To all theſe charges the Inca pleaded not guilty. With reſpect to the death of his brother, he alleged, that the Spaniards could take no cognizance of the fact. With regard to the taxes which he had levied, and the wars he had carried on, they were nothing to the Spaniards; and as to the conſpiracy againſt the Spaniards, he utterly denied it. He called heaven and earth to witneſs the integrity of his conduct, and how faithfully he had performed his engagements, and the perfidy of his accuſers. He deſired to be ſent over to Spain to take his trial before the emperor; but no regard was paid to his intreaties; he was condemned to be burnt alive; which cruel ſentence was mitigated, as a great favour, to ſtrangling; and the unhappy monarch was executed without mercy.

17
And ſtrangled.

The death of the Inca was followed by a revolution in the Spaniſh affairs, who now became generally odious. Hideous cries were ſet up by his women as the funeral proceſſion paſſed by their apartment: many offered to bury themſelves alive with him; and on being hindered, ſtrangled themſelves out of grief and vexation. The whole town of Caxamalca was filled with lamentation, which quickly extended itſelf over the whole kingdom. Friends and enemies accuſed the Spaniards of inhumanity and treachery. Loads of gold that were coming to Caxamalca by order of the deceaſed Inca were now ſtopped; and the loſs of the treaſure was the firſt unfortunate conſequence which the Spaniards felt from their late iniquitous conduct. The two factions of Indians united againſt Pizarro; and many of the Spaniards not only exclaimed againſt the cruelty of the invaders, but would even have mutinied, had not a ſenſe of the impending danger kept them quiet. At Cuzco the friends of the emperor Huaſcar proclaimed Mango Capac the legitimate brother of the late Inca, determining to ſupport him to the laſt againſt all the machinations of his enemies.

18
A general revolt of the Peruvians.

Pizarro, in the mean time, ſet up Taparpa, the ſon of Atabalipa, cauſing him to be treated with all the honours due to an emperor. Immediately he ſet out for Cuzco, the gaining of which was abſolutely neceſſary for his deſign. An army of Indians occupied the paſſes, and reſolved to diſpute his progreſs. The conteſt, however, was ſoon decided; the Spaniſh cavalry bore down every thing before them, and great numbers of Indians were ſlain. The conquerors gained a conſiderable booty; and Pizarro diſpatched Almagro to reduce Cuzco, while he himſelf founded a new colony in the fruitful valley of Xauna; which, however, was not permanent, being afterwards removed to the place where Lima now ſtands.

While Pizarro was thus employed, another commander, named *Ferdinando Soto*, was detached with 60 horſe to make the beſt of his way to Cuzco, and clear the road for the march of the remainder of the army. He was oppoſed by a formidable collection of Indians, who had fortified themſelves in order to defend a paſs againſt him: for which reaſon, fearing leſt his ſtrength might be unequal, he ſent a meſſage to Pizarro, deſiring that the Inca might join him, thinking that his preſence would awe the Peruvians, and prevent the further effuſion of blood; but his expectations were fruſtrated by the death of the Inca, which happened about this time; ſo that there was now a neceſſity for having recourſe to arms; for as the Spaniards ſet up no perſon in his room, the title of Mango Capac was univerſally acknowledged.

In the mean time, a new ſupply of ſoldiers arriving from Spain, Benalcazar, governor of St Michael, undertook an expedition againſt Quito, where, according to the report of the natives, Atabalipa had left the greateſt part of his treaſure. He accompliſhed his purpoſe with very great difficulty, having a country covered with rocks and mountains to paſs, and being oppoſed by large bodies of the natives. But when he got poſſeſſion of the city, to his extreme mortification, he found that the inhabitants had carried off all their gold and ſilver; for they being now acquainted with the ruling paſſion of the Spaniards, had taken care to diſappoint it, by removing the treaſures which they knew very well had been the cauſe of the expedition.

19 hili inva- d by Al- rado.

About the ſame time, Alvarado, governor of Guatimala, invaded the province of Chili. In this expedition his troops endured ſuch hardſhips, and ſuffered ſo much from the cold among the Andes, that a fifth part of the men and all the horſes died, and at the ſame time the reſt were ſo much diſpirited and emaciated, that they became quite unfit for ſervice. What was worſt of all, when they had arrived at the end of their journey, they met with a body of Spaniards drawn up in hoſtile array to oppoſe them. Theſe had been ſent againſt him by Pizarro, who claimed Chili as part of his juriſdiction, and were now joined by Benalcazar, with the troops under his command. Alvarado, however, advanced boldly to the attack; but, on the interpoſition of ſome moderate men in each party, the difference was accommodated; Alvarado engaged to return to his government, upon his being paid 100,000 peſos to defray the expence of his armament; however, moſt of his followers remained in the country, and enliſted in the ſervice of Pizarro.

30 e is obli- d by Pi- rro to andon e enter- iſe.

In the mean time Ferdinand Pizarro, the brother of the general, had landed in Spain, where he produced ſuch immenſe quantities of gold and ſilver as aſtoniſhed the court, even after all they had ſeen of the wealth of their new-diſcovered territories. The general's authority was confirmed to him with new powers and privileges, and the addition of 70 leagues extending along the coaſt, to the ſouthward of the territory granted in his former patent. Almagro had the title of *adelantado* or *governor* conferred upon him, with juriſdiction over 200 leagues of a country lying ſouthward from the province allotted to Pizarro; he himſelf was made a knight of the order of St Jago.

21 Honours conferred on Pizarro by the court of Spain.

Of theſe tranſactions ſome accounts were received at Peru before the arrival of Ferdinand Pizarro himſelf; and no ſooner did Almagro hear that he had obtained the royal grant of an independent government, than, pretending that Cuzco, the capital of all Peru, lay within his juriſdiction, he attempted to ſeize it. Pizarro was no leſs ready to oppoſe him; and a very dangerous civil war was about to take place, when the quarrel was made up, on condition that Almagro ſhould attempt the conqueſt of Chili; and if he did not find there an eſtabliſhment equivalent to his expectations, Pizarro ſhould yield up to him part of Peru.

By this reconciliation Pizarro was left at liberty to ſettle the internal policy of his province, which, though little qualified for a legiſlator, he attempted, by dividing the country into various diſtricts, appointing magiſtrates to preſide in each, and eſtabliſhing ſuch regulations concerning the adminiſtration of juſtice, the royal revenue, &c. as occurred to him. The ſeat of government he removed from Cuzco to Lima, which he named *Ceudad des los Reyes*, and which name it ſtill retains among the Spaniards in all legal and formal deeds. Its other name, *Lima*, is a corruption of *Rimac*, the name of the valley in which the city ſtands.

In the mean time Almagro had ſet out on his expedition to Chili; the event of which has been related under the article CHILI; and while he was thus employed, Pizarro encouraged ſome of his moſt diſtinguiſhed officers to invade thoſe provinces of the empire which had not yet been viſited by the Spaniards. This he did with a view to keep them employed, and prevent tumults; but it was attended with very terrible conſequences. No ſooner did Mango Capac the Inca perceive the ſecurity of the Spaniards in thus dividing their forces, than he ſeized the opportunity of making one vigorous effort to redreſs the wrongs of himſelf and his countrymen, and expel the invaders, who had tyrannized in ſuch a cruel manner. Though ſtrictly guarded by the Spaniards, he found means to communicate his intentions to the chief men of his nation, whom he joined in the year 1536, under pretence of celebrating a feſtival which he had obtained liberty from Pizarro to attend. Upon this the ſtandard of war was immediately erected, and a moſt formidable army, according to the Spaniſh hiſtorians, of 200,000 men collected. Many Spaniards were maſſacred in their habitations, and ſeveral detachments entirely cut off; and while this vaſt army laid ſiege to Cuzco, another formidable body inveſted Lima, and kept the governor cloſely ſhut up. The greateſt effort, however, was

22 A dreadful inſurrection of the Peruvians.

was made againſt Cuzco, which was defended by Pizarro and his two brothers, with only 170 men. The ſiege laſted nine months; many of the Spaniards were killed; among whom was Juan Pizarro, the general's brother, and the beſt beloved of them all. The reſt were reduced to the moſt deſperate ſituation, when Almagro appeared ſuddenly in the neighbourhood of Cuzco. He had received ſuch accounts of the inſurrection in Peru, as would at any rate have determined him to return to the aſſiſtance of Pizarro; but beſides this, he had now received the royal patent, creating him governor of Chili, and deemed it certain beyond all contradiction, that Cuzco lay within his juriſdiction; for which reaſon he haſtened to prevent it from falling into the hands of the Peruvians. On his arrival his aſſiſtance was ſolicited by both parties. The Inca made many advantageous propoſals; but at length deſpairing of obtaining any cordial union with a Spaniard, he attacked him in the night by ſurpriſe with a great body of choſen troops. But the Spaniſh valour and diſcipline prevailed againſt all the numbers of their enemies; and the Peruvians were repulſed with ſuch ſlaughter, that a great part of the remainder diſperſed, and Almagro advanced to the gates of Cuzco without oppoſition. Pizarro's brothers took meaſures to oppoſe his entrance; but prudence for the preſent reſtrained both parties from entering into a civil war while they were ſurrounded with enemies; and therefore each leader endeavoured to corrupt the followers of his antagoniſt. In this Almagro had the advantage; and ſo many of Pizarro's troops deſerted in the night, that Almagro was encouraged to advance towards the city, where he ſurpriſed the centinels; and inveſting the houſe where the two brothers were lodged, he compelled them, after an obſtinate defence, to ſurrender at diſcretion; and Almagro's authority over Cuzco was immediately recognized as authentic.

23
They are defeated, and diſperſe.

24
Civil war between Pizarro and Almagro.

In this fray only two or three perſons were killed; but matters ſoon began to wear a more ſerious aſpect. Francis Pizarro, having diſperſed the Peruvians who inveſted Lima, and received conſiderable reinforcements from other provinces, ordered 500 men under the command of Alonſo de Alvarado to march to Cuzco, in hopes of relieving his brothers, if they were not already cut off. They advanced to a ſmall diſtance from the capital, before they knew that they had a more formidable enemy than the Indians to encounter. When they ſaw their countrymen drawn up on the banks of a river to oppoſe them, they were greatly ſurpriſed; however, Almagro, who wiſhed rather to gain them than to fight, began with attempting to ſeduce their leader. Alvarado could not by any means be gained over; but being inferior in military ſkill, Almagro attacked him by ſurpriſe, entirely defeated and diſperſed his army, taking himſelf and ſome of his principal officers priſoners.

This victory ſeemed deciſive; and Almagro was adviſed to make it ſo by putting to death Gonzalo and Ferdinand Pizarros, Alvarado, and ſome others whom he could not hope to gain. This advice, however, he declined from motives of humanity, and a deſire of making his adverſary appear the aggreſſor. For theſe reaſons, inſtead of marching directly againſt Pizarro, he retired quietly to Cuzco; which gave his adverſary time to recollect himſelf from the diſorder into which the news of ſo many diſaſters had thrown him. He began again to practiſe upon Almagro thoſe arts which had before proved ſucceſsful; and Almagro again ſuffered himſelf to be deceived by pretended offers of pacification. The negociations for this purpoſe were protracted for ſeveral months; and while Almagro was employed in detecting and eluding the fraudulent intentions of the governor, Gonzalo Pizarro and Alvarado found means to corrupt the ſoldiers who guarded them, and not only made their own eſcape, but perſuaded 60 of Almagro's men to accompany them. There now remained only Ferdinand Pizarro in the hands of Almagro; and he was delivered by another act of treachery. The general propoſed that all points of controverſy ſhould be ſubmitted to the deciſion of their ſovereign; and that Ferdinand Pizarro ſhould be inſtantly ſet at liberty, and return to Spain, together with ſome other officers whom the general propoſed to ſend over to ſhew the juſtice of his claims. Though the intention of Pizarro by making this propoſal was evident, Almagro was deceived by it, and releaſed thoſe whom Pizarro wanted; which he had no ſooner done, than the latter threw off all diſguiſe, and openly declared, that arms alone muſt now decide the matter between them. He therefore immediately ſet out for Cuzco with an army of 700 men, to which Almagro had only 500 to oppoſe. From the weakneſs of his forces, probably, Almagro did not attempt to guard ſome ſtrong paſſes, through which Pizarro had to march, but waited patiently for his adverſary in a plain open country.

25
Almagro defeated and taken priſoner.

In the mean time, Pizarro advanced without any obſtruction from his enemy; and an engagement ſoon happened, in which Almagro was defeated and taken priſoner. The conquerors behaved with great cruelty, maſſacring a great number of officers, and treating Almagro himſelf with great ſeverity. The Indians had aſſembled in great numbers to ſee the battle, with an intention to join the vanquiſhed party; but were ſo much overawed by the Spaniards, that they retired quietly after the battle was over, and thus loſt the only opportunity they ever had of expelling their tyrants.—Almagro, after having for ſome months languiſhed in priſon, was at length formally tried, and condemned to die by Pizarro. Notwithſtanding his conſummate bravery for which he was remarkable, this hardy veteran could not bear the deliberate approach of death, but condeſcended to uſe intreaties to ſave his life. The Pizarros, however, continued inflexible; and he was firſt ſtrangled in priſon, and then publicly beheaded. He left one ſon by an Indian woman, whom he appointed his ſucceſſor, by virtue of a power granted him by the emperor.

26
And ſtrangled.

As during theſe diſſenſions all intercourſe with Spain ceaſed, it was ſome time before the accounts of the civil war were received at court. The firſt intelligence was given by ſome of Almagro's ſoldiers, who had left America on the ruin of their cauſe; and they did not fail to repreſent the injuſtice and violence of Pizarro in the ſtrongeſt colours, which ſtrongly prejudiced the emperor againſt him. In a ſhort time, however, Ferdinand Pizarro arrived, and endeavoured to give matters a new turn. The emperor was uncertain which of them he ought to believe; and therefore thought it neceſſary to ſend over ſome perſon with ample powers to inquire into the merits of the cauſe, and to determine certainly who was in the wrong. If he found the governor ſtill alive, he was to aſſume only the title of judge, in order to have the appearance of acting in concert with him; but if he was dead, the viceroy might then produce his commiſſion appointing him Pizarro's ſucceſſor in the government. This complaiſance to Pizarro, however, proceeded more from a dread of his power than from any other thing; for in the mean time, his brother Ferdinand was arreſted at Madrid, and confined to a priſon, where he remained above 20 years. The perſon nominated to this important truſt was Chriſtoval Vaco de Caſtro.

27 Peru divided by Pizarro among his aſſociates.

While this gentleman was preparing for his voyage, Pizarro, conſidering himſelf as the unrivalled maſter of Peru, proceeded to parcel out its territories among the conquerors; and had this diviſion been made with any degree of impartiality, the extent of country which he had to beſtow was ſufficient to have gratified his friends, and to have gained his enemies. But Pizarro conducted this tranſaction, not with the equity and candour of a judge attentive to diſcover and to reward merit, but with the illiberal ſpirit of a party-leader. Large diſtricts, in parts of the country moſt cultivated and populous, were ſet apart as his own property, or granted to his brothers, his adherents, and favourites. To others, lots leſs valuable and inviting were aſſigned. The followers of Almagro, amongſt whom were many of the original adventurers, to whoſe valour and perſeverance Pizarro was indebted for his ſucceſs, were totally excluded from any portion in thoſe lands, towards the acquiſition of which they had contributed ſo largely. As the vanity of every individual ſets an immoderate value upon his own ſervices, and the idea of each, concerning the recompence due to them, roſe gradually to a more exorbitant height in proportion as their conqueſts extended, all who were diſappointed in their expectations exclaimed loudly againſt the rapaciouſneſs and partiality of the governor. The partiſans of Almagro murmured in ſecret, and meditated revenge.

Rapid as the progreſs of the Spaniards in South America had been ſince Pizarro landed in Peru, their avidity of dominion was not yet ſatisfied. The officers to whom Ferdinand Pizarro gave the command of different detachments, penetrated into ſeveral new provinces; and though ſome of them were expoſed to great hardſhips in the cold and barren regions of the Andes, and others ſuffered diſtreſs not inferior amidſt the woods and marſhes of the plains, they made diſcoveries and conqueſts which extended their knowledge of the country, as well as added to their power. Pedro de Valdivia re-aſſumed Almagro's ſcheme of invading Chili; and, notwithſtanding the fortitude of the natives in defending their poſſeſſions, made ſuch progreſs in the conqueſt of the country, that he founded the city of St Jago, and gave a beginning to the eſtabliſhment of the Spaniſh dominion there. But of all the enterpriſes undertaken about this period, that of Gonzales Pizarro was the moſt remarkable. The governor, who ſeems to have reſolved that no perſon in Peru ſhould poſſeſs any ſtation of diſtinguiſhed eminence or authority but thoſe of his own family, had deprived Benalcazar, the conqueror of Quito, of his command in that kingdom, and appointed his brother Gonzalo to take the government of it. He inſtructed him to attempt the diſcovery and conqueſt of the country to the eaſt of the Andes; which, according to the information of the Indians, abounded with cinnamon and other valuable ſpices. Gonzales, not inferior to any of his brothers in courage, and no leſs ambitious of acquiring diſtinction, eagerly engaged in this difficult ſervice. He ſet out from Quito at the head of 340 ſoldiers, near one half of whom were horſemen, with 4000 Indians to carry their proviſions. In forcing their way through the defiles, or over the ridges of the Andes, exceſs of cold and fatigue, to neither of which they were accuſtomed, proved fatal to the greater part of the wretched attendants. The Spaniards, tho' more robuſt, and inured to a variety of climates, ſuffered conſiderably, and loſt ſome men; but when they deſcended into the low country, their diſtreſs increaſed. During two months it rained inceſſantly, without any interval of fair weather long enough to dry their cloaths. The vaſt plains upon which they were now entering, either altogether without inhabitants, or occupied by the rudeſt and leaſt induſtrious tribes in the New World, yielded little ſubſiſtence. They could not advance a ſtep but as they cut a road through woods, or made it through marſhes. Such inceſſant toil, and continual ſcarcity of food, ſeem more than ſufficient to have exhauſted and diſpirited any troops. But the fortitude and perſeverance of the Spaniards in the 16th century were inſuperable. Allured by frequent but falſe accounts of rich countries before them, they perſiſted in ſtruggling on, until they reached the banks of the Coca or Napo, one of the large rivers whoſe waters pour into the Maragnon, and contribute to its grandeur. There, with infinite labour, they built a bark, which they expected would prove of great utility, both in conveying them over rivers, in procuring proviſions, and in exploring the country. This was manned with 50 ſoldiers, under the command of Francis Orellana, the officer next in rank to Pizarro. The ſtream carried them down with ſuch rapidity, that they were ſoon far a-head of their countrymen, who followed ſlowly and with difficulty by land.

28 Expedition of Gonzales Pizarro.

29 Orellana ſails down the river Maragnon, and deſerts Pizarro.

At this diſtance from his commander, Orellana, a young man of an aſpiring mind, began to fancy himſelf independent; and, tranſported with the predominant paſſion of the age, he formed the ſcheme of diſtinguiſhing himſelf as a diſcoverer, by following the courſe of the Maragnon until it joined the ocean, and by ſurveying the vaſt regions through which it flows. This ſcheme of Orellana's was as bold as it was treacherous. For, if he be chargeable with the guilt of having violated his duty to his commander, and with having abandoned his fellow-ſoldiers in a pathleſs deſart, where they had hardly any hopes of ſucceſs, or even of ſafety, but what were founded on the ſervice which they expected from the bark, his crime is, in ſome meaſure, balanced by the glory of having ventured upon a navigation of near 2000 leagues, through unknown nations, in a veſſel haſtily conſtructed with green timber, and by very unſkilful hands, without proviſions, without a compaſs, or a pilot. But his courage and alacrity ſupplied every defect. Committing himſelf fearleſsly to the guidance of the ſtream, the Napo bore him along to the ſouth, until he reached the great channel of the Maragnon. Turning with it towards the coaſt, he held on his courſe in that direction. He made frequent deſcents on both ſides the river, ſometimes ſeizing by force of arms the proviſions of the fierce ſavages ſeated on its banks, and ſometimes procuring a ſupply of food by a friendly intercourſe with more gentle tribes. After a long ſeries of dangers, which he encountered with amazing fortitude, and of diſtreſſes which he ſupported with no leſs magnanimity, he reached the ocean, where new perils awaited him. Theſe he likewiſe ſurmounted, and got ſafe to the Spaniſh ſettlement in the iſland Cubagua; from thence he ſailed to Spain. The vanity natural to travellers who viſit regions unknown to the reſt of mankind, and the art of an adventurer, ſolicitous to magnify his own merit, concurred in prompting him to mingle an extraordinary proportion of the marvellous in the narrative of his voyage. He pretended to have diſcovered nations ſo rich, that the roofs of their temples were covered with plates of gold; and deſcribed a republic of women ſo warlike and powerful, as to have extended their dominion over a conſiderable tract of the fertile plains which he had viſited. Extravagant as thoſe tales were, they gave riſe to an opinion, that a region abounding with gold, diſtinguiſhed by the name of *El Dorado*, and a community of Amazons, were to be found in this part of the New World; and ſuch is the propenſity of mankind to believe what is wonderful, that it has been ſlowly, and with difficulty, that reaſon and obſervation have exploded thoſe fables. The voyage, however, even when ſtripped of every romantic embelliſhment, deſerves to be recorded, not only as one of the moſt memorable occurrences in that adventrous age, but as the firſt event that led to any certain knowledge of thoſe immenſe regions that ſtretch eaſtward from the Andes to the ocean.

30
Extreme diſtreſs of Gonzalo Pizarro and his men.

No words can deſcribe the conſternation of Pizarro, when he did not find the bark at the confluence of the Napo and Maragnon, where he had ordered Orellana to wait for him. He would not allow himſelf to ſuſpect that a man, whom he had entruſted with ſuch an important command, could be ſo baſe and ſo unfeeling as to deſert him at ſuch a juncture. But imputing his abſence from the place of rendezvous to ſome unknown accident, he advanced above 50 leagues along the banks of the Maragnon, expecting every moment to ſee the bark appear with a ſupply of proviſions. At length he came up with an officer whom Orellana had left to periſh in the deſart, becauſe he had the courage to remonſtrate againſt his perfidy. From him he learned the extent of Orellana's crime; and his followers perceived at once their own deſperate ſituation, when deprived of their only reſource. The ſpirit of the ſtouteſt hearted veteran ſunk within him; and all demanded to be led back inſtantly. Pizarro, though he aſſumed an appearance of tranquillity, did not oppoſe their inclination. But he was now 1200 miles from Quito; and in that long march the Spaniards encountered hardſhips greater than thoſe they had endured in their progreſs outward, without the alluring hopes which then ſoothed and animated them under their ſufferings. Hunger compelled them to feed on roots and berries, to eat all their dogs and horſes, to devour the moſt loathſome reptiles, and even to gnaw the leather of their ſaddles and ſword-belts. Four thouſand Indians, and 210 Spaniards, periſhed in this wild and diſaſtrous expedition, which continued near two years; and as 50 men were aboard the bark with Orellana, only 80 got back to Quito. Theſe were naked like ſavages, and ſo emaciated with famine, or worn out with fatigue, that they had more the appearance of ſpectres than of men.

31
A conſpiracy formed againſt the governor.

But, inſtead of returning to enjoy the repoſe which his condition required, Pizarro, on entering Quito, received accounts of a fatal event that threatened calamities more dreadful to him than thoſe through which he had paſſed. From the time that his brother made that partial diviſion of his conqueſts which has been mentioned, the adherents of Almagro, conſidering themſelves as proſcribed by the party in power, no longer entertained any hope of bettering their condition. Great numbers in deſpair reſorted to Lima, where the houſe of young Almagro was always open to them; and the ſlender portion of his father's fortune, which the governor allowed him to enjoy, was ſpent in affording them ſubſiſtence. The warm attachment with which every perſon who ſerved under the elder Almagro devoted himſelf to his intereſts, was quickly transferred to his ſon, who was now grown up to the age of manhood, and poſſeſſed all the qualities which captivate the affections of ſoldiers. Of a graceful appearance, dextrous at all martial exerciſes, bold, open, generous, he ſeemed to be formed for command; and as his father, conſcious of his own inferiority from the total want of education, had been extremely attentive to have him inſtructed in every ſcience becoming a gentleman; the accompliſhments which he had acquired heightened the reſpect of his followers, as they gave him diſtinction and eminence among illiterate adventurers. In this young man the Almagrians found a point of union which they wanted; and looking up to him as their head, were ready to undertake any thing for his advancement. Nor was affection for Almagro their only incitement; they were urged on by their own diſtreſſes. Many of them, deſtitute of common neceſſaries, and weary of loitering away life, a burden to their chief, or to ſuch of their aſſociates as had ſaved ſome remnant of their fortune from pillage and confiſcation, longed impatiently for an occaſion to exert their activity and courage, and began to deliberate how they might be avenged on the author of all their miſery. Their frequent cabals did not paſs unobſerved; and the governor was warned to be on his guard againſt men who meditated ſome deſperate deed, and had reſolution to execute it. But, either from the native intrepidity of his mind, or from contempt of perſons whoſe poverty rendered their machinations of little conſequence, he diſregarded the admonitions of his friends. "Be in no pain (ſaid he careleſsly) about my life; it is perfectly ſafe, as long as every man in Peru knows that I can in a moment put him to death who dares to harbour a thought againſt it." This ſecurity gave the Almagrians full leiſure to digeſt and ripen every part of their ſcheme; and Juan de Herrada, an officer of great abilities, who had the charge of Almagro's education, took the lead in their conſultations, with all the zeal which that connection inſpired, and with all the authority which the aſcendant that he was known to have over the mind of his pupil gave him.

On Sunday, the 26th of June, at mid-day, the ſeaſon

ſon of tranquillity and repoſe in all ſultry climates, Herrada, at the head of 18 of the moſt determined conſpirators, ſallied out of Almagro's houſe in complete armour; and drawing their ſwords, as they advanced haſtily towards the governor's palace, cried out, "Long live the king, but let the tyrant die." Their aſſociates, warned of their motions by a ſignal, were in arms at different ſtations ready to ſupport them. Though Pizarro was uſually ſurrounded by ſuch a numerous train of attendants as ſuited the magnificence of the moſt opulent ſubject of the age in which he lived, yet as he was juſt riſen from table, and moſt of his own domeſtics had retired to their own apartments, the conſpirators paſſed through the two outer courts of the palace unobſerved. They were at the bottom of the ſtair-caſe, before a page in waiting could give the alarm to his maſter, who was converſing with a few friends in a large hall. The governor, whoſe ſteady mind no form of danger could appal, ſtarting up, called for arms, and commanded Franciſco de Chaves to make faſt the door. But that officer, who did not retain ſo much preſence of mind as to obey this prudent order, running to the top of the ſtair-caſe, wildly aſked the conſpirators what they meant, and whither they were going? Inſtead of anſwering, they ſtabbed him to the heart, and burſt into the hall. Some of the perſons who were there threw themſelves from the windows; others attempted to fly; and a few drawing their ſwords, followed their leader into an inner apartment. The conſpirators, animated with having the object of their vengeance now in view, ruſhed forward after them. Pizarro, with no other arms than his ſword and buckler, defended the entry, and, ſupported by his half-brother Alcantara and his little knot of friends, maintained the unequal conteſt with intrepidity worthy of his paſt exploits, and with the vigour of a youthful combatant. "Courage, (cried he), companions, we are yet enow to make thoſe traitors repent of their audacity." But the armour of the conſpirators protected them, while every thruſt they made took effect. Alcantara fell dead at his brother's feet; his other defendants were mortally wounded. The governor, ſo weary that he could hardly wield his ſword, and no longer able to parry the many weapons furiouſly aimed at him, received a deadly thruſt full in his throat, ſunk to the ground, and expired.

32
ho is
urdered.

As ſoon as he was ſlain, the aſſaſſins ran out into the ſtreets, and waving their bloody ſwords, proclaimed the death of the tyrant. Above 200 of their aſſociates having joined them, they conducted young Almagro in ſolemn proceſſion through the city; and aſſembling the magiſtrates and principal citizens, compelled them to acknowledge him as lawful ſucceſſor to his father in his government. The palace of Pizarro, together with the houſes of ſeveral of his adherents, were pillaged by the ſoldiers; who had the ſatisfaction at once of being avenged on their enemies, and of enriching themſelves by the ſpoils of thoſe through whoſe hands all the wealth of Peru had paſſed.

33
oung Al-
gro
ads the
els.

The new governor marched into the heart of the empire, in order to reduce ſuch places as refuſed to acknowledge his authority. A multitude of ruffians joined him on his march. His army breathed nothing but vengeance and plunder: every thing gave way before it. If the military talents of the general had equalled the ardour of his troops, the war had ended here. Unhappily for Almagro, he had loſt his conductor John de Herrada. His inexperience made him fall into the ſnares that were laid for him by Pedro Alvares, who had put himſelf at the head of the oppoſite party. He loſt, in attempting to unravel his plots, that time that he ought to have employed in fighting. In theſe circumſtances, an event, which no one could have foreſeen, happened to change the face of affairs.

The licentiate Vaca di Caſtro, who had been ſent from Europe to try the murderers of old Almagro, arrived at Peru. As he was appointed to aſſume the government in caſe Pizarro was no more, all who had not ſold themſelves to the tyrant haſtened to acknowledge him. Uncertainty and jealouſy, which had for too long a time kept them diſperſed, were no longer an obſtacle to their re-union. Caſtro, who was as reſolute as if he had grown old in the ſervice, did not ſuffer their impatience to languiſh, but inſtantly led them againſt the enemy. The two armies engaged at Chapas on the 16th of September 1542, and fought with inexpreſſible obſtinacy. Victory, after having wavered a long time, at the cloſe of the day decided in favour of that party whoſe cauſe was the moſt juſt. Thoſe among the rebels who were moſt guilty, dreading to languiſh under diſgraceful tortures, provoked the conquerors to murder them, crying out, like men in deſpair, *It was I who killed Pizarro.* Their chief was taken priſoner, and died on the ſcaffold.

34
He is defeated by Vaca di Caſtra.

While theſe ſcenes of horror were tranſacting in America, the Spaniards in Europe were employed in finding out expedients to terminate them; though no meaſures had been taken to prevent them. Peru had only been made ſubject to the audience of Panama, which was too remote to ſuperintend the maintenance of good order, and had too little influence to make its decrees reſpected. A ſupreme tribunal was then eſtabliſhed at Lima for the diſpenſation of juſtice, which was to be inveſted with authority ſufficient to enforce and to reward a due obedience to the laws. Blaſco Nunez Vela, who preſided in it as viceroy, arrived in 1544, attended by his ſubordinates in office, and found every thing in the moſt dreadful diſorder.

To put an end to theſe tumults which now ſubſiſted, would have required a profound genius, and many other qualities which are ſeldom united. Nunez had none of theſe advantages. Nature had only given him probity, firmneſs, and ardour; and he had taken no pains to improve theſe gifts. With theſe virtues, which were almoſt defects in his ſituation, he began to fulfil his commiſſion, without regard to places, perſons, or circumſtances.

35
Bad conduct of the viceroy Nunez Vela.

Contrary to the opinion of all intelligent perſons, who wiſhed that he ſhould wait for freſh inſtructions from Europe, he publiſhed ordinances, which declared that the lands the conquerors had ſeized ſhould not paſs to their deſcendants, and which diſpoſſeſſed thoſe who had taken part in the civil commotions. All the Peruvians who had been enſlaved by monks, biſhops, and perſons belonging to the government, were declared free. Thoſe who belonged to other maſters were to be freed from their ſhackles at the death of their oppreſſors. They could no longer be compelled to bury themſelves in the mines, nor could any kind of labour be exacted from them without payment. Their tribute was fixed. The Spaniards who travelled on foot were deprived of the right of taking three Indians to carry their baggage; and thoſe who travelled on horſeback, of the right of taking five. The caciques were diſcharged from the obligation of furniſhing the traveller and his retinue with proviſions gratis. Other tyrannical eſtabliſhments alſo would ſoon have been proſcribed; and the conquered people were on the eve of being ſheltered under the protection of laws, which would at leaſt have tempered the rigours of the right of conqueſt, if even they had not entirely repaired the injuſtice of them; but it ſhould ſeem that the Spaniſh government was only to be unfortunate in the good it attempted to effect.

A change ſo unexpected filled thoſe with conſternation who ſaw their fortunes wreſted from them, or who loſt the flattering hope of tranſmitting theirs to their poſterity. Even thoſe who were not affected by theſe intereſted views, being accuſtomed to look upon the Indians as the inſtruments and victims of their avarice, had no conception that any other ideas could prevail concerning them. From aſtoniſhment they proceeded to indignation, murmuring, and ſedition. The viceroy was degraded, put in irons, and baniſhed to a deſart iſland, till he could be conveyed to Spain.

36
He is overcome and killed by Gonzales Pizarro.

Gonzales Pizarro was then returned from his hazardous expedition, which had employed him long enough to prevent him from taking a part in thoſe revolutions which had ſo rapidly ſucceeded each other. The anarchy he found prevailing at his return, inſpired him with the idea of ſeizing the ſupreme authority. His fame and his forces made it impoſſible that this ſhould be refuſed him; but his uſurpation was marked with ſo many enormities, that Nunez was regreted. He was recalled from exile, and ſoon collected a ſufficient number of forces to enable him to take the field. Civil commotions were then renewed with extreme fury by both parties. No quarter was aſked or given on either ſide. The Indians took part in this as they had done in the preceding wars; ſome ranged themſelves under the ſtandard of the viceroy, others under the banners of Gonzales. From 15,000 to 20,000 of theſe unhappy wretches, who were ſcattered about in each army, dragged up the artillery, levelled the roads, carried the baggage, and deſtroyed one another. Their conquerors had taught them to be ſanguinary. After a variety of advantages for a long time alternately obtained, fortune at length favoured the rebellion under the walls of Quito in the month of January, in the year 1545; and Nunez with the greateſt part of his men were maſſacred.

Pizarro took the road of Lima, where they were deliberating on the ceremonies with which they ſhould receive him. Some officers wiſhed that a canopy ſhould be carried for him to march under, after the manner of kings. Others, with adulation ſtill more extravagant, pretended that part of the walls of the town, and even ſome houſes, muſt be pulled down; as was the cuſtom at Rome, when a general obtained the honours of a triumph. Gonzales contented himſelf with making his entrance on horſeback, preceded by his lieutenant, who marched on foot. Four biſhops accompanied him, and he was followed by the magiſtrates. The ſtreets were ſtrewn with flowers, and the air reſounded with the noiſe of bells and various muſical inſtruments. This homage totally turned the head of a man naturally haughty, and of confined ideas. He ſpoke and acted in the moſt deſpotic manner.

Had Gonzales poſſeſſed judgment and the appearance of moderation, it would have been poſſible for him to render himſelf independent. The principal perſons of his party wiſhed it. The majority would have beheld this event with indifference, and the reſt would have been obliged to conſent to it. Blind cruelties, inſatiable avarice, and unbounded pride, altered theſe diſpoſitions. Even thoſe, whoſe intereſts were connected with thoſe of the tyrant, wiſhed for a deliverer.

37
An end put to the troubles by Pedro di la Gaſca.

Such a deliverer arrived from Europe in the perſon of the licentiate Pedro di la Gaſca. The ſquadron and the provinces of the mountains immediately declared for a perſon who was inveſted with a lawful authority to govern them. Thoſe who lived concealed in deſarts, caverns, and foreſts, quitted their retreats to join him. Gonzales, who ſaw no reſource left to ſupport him but in ſome great atchievement, took the road of Cuzco, with a reſolution to give battle. At ſome leagues diſtance from this place he met the royal army, and attacked it on the 9th of June 1548. One of his lieutenants, ſeeing him abandoned at the firſt charge by his beſt ſoldiers, adviſed him to throw himſelf into the enemy's battalions, and periſh like a Roman: but this weak man choſe rather to ſurrender, and end his life on a ſcaffold. Carvajal, a more able warrior, and more ferocious than himſelf, was quartered. This man, when he was expiring, boaſted that he had maſſacred with his own hand 1400 Spaniards and 20,000 Indians.

Such was the laſt ſcene of a tragedy, of which every act has been marked with blood. The government was moderate enough not to continue the proſcriptions; and the remembrance of the horrid calamities they had ſuffered kept the Spaniards in the bounds of ſubjection. What ſtill remained of that commotion that had been raiſed in their minds, inſenſibly ſunk into a calm; and the country hath remained in quiet ever ſince.

38
Hard fate of the Peruvians.

With regard to the Peruvians, the moſt cruel meaſures were taken to render it impoſſible for them to rebel. Tupac Amaru, the heir of their laſt king, had taken refuge in ſome remote mountains, where he lived in peace. There he was ſo cloſely ſurrounded by the troops which had been ſent out againſt him, that he was forced to ſurrender. The viceroy Francis de Toledo cauſed him to be accuſed of ſeveral crimes that he had not committed, and for which he was beheaded in 1571. All the other deſcendants of the Incas ſhared the ſame fate, under pretence that they had conſpired againſt their conquerors. The horror of theſe enormities excited ſo univerſal an indignation both in the Old and the New World, that Philip II. thought himſelf obliged to diſavow them; but the infamous policy of this prince was ſo notorious, that no credit was given to this appearance of his juſtice and humanity.

39
Extent of the empi

The empire of Peru, at the time it was ſubdued, extended along the South Sea, from the River of Emeralds to Chili, and on the land ſide to Popayan, according to ſome geographers. It contained within its extent that famous chain of mountains which riſes in the Terra Magellanica, and is gradually loſt in Mexico, in order to unite, as it ſhould ſeem, the ſouthern parts of America with the northern. Its territory, which is very irregular, may be divided into three claſſes.

40
Deſcription of the mountains called Cordeleras.

The principal Cordeleras form the firſt. The ſummits of theſe, ſays M. de la Condamine, are loſt in the clouds, and almoſt all of them are covered with enormous maſſes of ſnow as old as the world. From ſeveral of theſe ſummits, which have in part tumbled down, and from theſe immenſe heaps of ſnow, torrents of ſmoke and flame iſſue. Such are the ſummits of Colopaxi, Tongourargua, and Sangai. The greateſt part of the reſt have formerly been volcanoes, or will probably one day become ſuch. Hiſtory has only preſerved to us the æra of their eruptions ſince the diſcovery of America; but the pumice-ſtones, the calcined earths with which they are ſtrewn, and the evident veſtiges that the flame hath left, are authentic teſtimonies of the reality of former eruptions: their height is prodigious.

Cayambour, which is ſituated directly under the equator, and Antiſona, which is only five leagues diſtant from it to the ſouth, are more than 3000 toiſes high, reckoning from the level of the ſea; and Chimboraco, which is near 3220 toiſes high, ſurpaſſes by one third the altitude of the Peak of Teneriffe, the higheſt mountain of the old hemiſphere. Pitchincha and Caracon, where the French Academicians made moſt of their obſervations with regard to the figure of the earth, have only 2430 and 2470 toiſes of abſolute height; and this is the higheſt mountain that was ever aſcended. Eternal ſnows have hitherto rendered ſummits of greater altitude inacceſſible.

From this boundary, which is where the ſnow never melts, not even in the torrid zone, one hardly ſees, in deſcending 100 or 150 toiſes down, any thing except naked rocks or dry ſands: a little lower, one may perceive ſome moſs that covers the rocks; various kinds of heath, which, though green and damp, make a clear fire; round hillocks of ſpungy earth, on which grow ſmall radiated and ſtarry plants, whoſe petals are like the leaves of yew. Throughout the whole of this ſpace, the ſnow is only temporary; but it continues ſometimes whole weeks and months. Lower ſtill, the ground is commonly covered with a ſort of looſe graſs, which riſes a foot and a half high, or two feet. This ſpecies of hay is the proper characteriſtic that diſtinguiſhes the mountains which the Spaniards call *Paræmos*. They only give this name to heath, or ſuch uncultivated ground as is too high for wood to grow on it, or where the rain ſeldom falls otherwiſe than in the form of ſnow, tho' it immediately melts. And, laſtly, in deſcending ſtill lower, to the height of about 2000 toiſes above the level of the ſea, one ſees it ſometimes ſnow and ſometimes rain.

41
Climate, &c.

When we come down from theſe mountains, we find others that are leſs conſiderable, which occupy the middle of Peru. The ſummit of theſe is commonly cold, barren, and full of mines. The valleys between them are covered with numerous flocks, and ſeem to offer to agriculture the moſt copious harveſts. There are ſeldom above two months of winter here; and in the greateſt heat we need only paſs out of the ſun into the ſhade, to enjoy the temperate zone. This rapid alternative of ſenſation is not, however, invariable in a climate, which, by the diſpoſition alone of the ground, often changes in the courſe of a league. But let it be as it will, it is always found healthy. There is no malady peculiar to theſe countries, and thoſe of our climate ſeldom prevail there. An European veſſel, however, in 1719, brought thither an epidemic diſorder, which carried off a great number of Spaniards and Meſtees, and above 200,000 Indians. A more fatal preſent ſtill, which theſe people have received in exchange for their gold, is the ſmall-pox. It ſhewed itſelf here for the firſt time in 1588, and has not failed ſince to make at intervals inexpreſſible ravages.

The people are not leſs expoſed to this fatal diſtemper on the coaſts known by the name of *valleys*. Their temperature is not the ſame as is elſewhere found in the ſame latitude. It is very agreeable; and, though the four ſeaſons of the year are ſenſibly felt here, there is none that can with propriety be deemed inconvenient. The winter is the moſt ſtrongly marked. This has been accounted for by the winds of the ſouth pole, which bring along with them the impreſſion of thoſe ſnows and that ice from which they firſt came: but this they preſerve only in part, becauſe they blow while a thick fog lies upon the earth. In reality, theſe groſs vapours never regularly riſe till towards noon: but it is ſeldom that they diſperſe. The ſky commonly continues ſo much covered with them, that the rays of the ſun, which ſometimes appear, can only in a very ſlight manner mitigate the cold.

Whatever may be the cauſe of ſo regular a winter under the torrid zone, it is certain that theſe valleys, which are covered with heaps of ſand, are abſolutely barren for a ſpace of more than 100 leagues, from Truxillo to Lima. The reſt of the coaſt is leſs ſandy, but it is ſtill too much ſo to be fruitful. No fields are there found that can be ſtyled *fertile*, except in ſuch lands as are watered by the ſtreams which deſcend from the mountains.

Rain might contribute to impart to the ſoil the fertility of which it is deſtitute; but it is never known to rain in Lower Peru. Natural philoſophy has exerted its efforts in vain to diſcover the cauſe of a phænomenon ſo extraordinary. To this it is owing, that the houſes, though only built of crude brick, or of earth mixed with a little graſs, are of very long duration. Their covering is only a ſimple matting, placed horizontally, with a layer of aſhes an inch deep above, to abſorb the moiſture of the fog.

The ſame reaſons that prevent its raining in the valleys, undoubtedly alſo hinder ſtorms. Thoſe of their inhabitants who never travelled in the mountains, are perfect ſtrangers to thunder and lightning. Their terror is equal to their aſtoniſhment, when, out of their country, they firſt behold ſo uncommon a ſpectacle.

But they have a phænomenon much more dangerous and dreadful, and which, in its conſequences, leaves much deeper impreſſions in the human imagination than thunder and the ravages that accompany it. Earthquakes, which in other countries are ſo rare, that whole generations paſs without beholding one, are ſo common in the valleys of Peru, that they have there contracted an habit of reckoning them as a ſeries of dates; and they are ſo much the more memorable, as their frequent return does not diminiſh their violence. There are few places on this extenſive coaſt which do not preſent moſt dreadful monuments of theſe horrible convulſions of the earth.

42 How the country was originally ſettled by the Spaniards.

At the time when the firſt conqueſts were made, when emigrations were moſt frequent, the country of the Incas had a much greater reputation for riches than New Spain; and, in reality, for a long time much more conſiderable treaſures were brought away from it. The deſire of partaking of them muſt neceſſarily draw thither, as was really the caſe, a greater number of Caſtilians. Though they all almoſt went over there with the hope of returning to their country to enjoy the fortune they might acquire, yet the majority of them ſettled in the colony. They were induced to this by the ſoftneſs of the climate, the ſalubrity of the air, and the goodneſs of the proviſions. Mexico preſented not the ſame advantages, and did not give them reaſon to expect ſo much independence as a land infinitely more remote from the mother-country.

Cuſco attracted the conquerors in multitudes. They found this capital built on a ground that was very irregular, and divided into as many quarters as there were provinces in the empire. Each of the inhabitants might follow the uſages of his native country; but every body was obliged to conform to the worſhip eſtabliſhed by the founder of the monarchy. There was no edifice that had any grandeur, elegance, or convenience; becauſe the people were ignorant of the firſt elements of architecture. The magnificence of what they called the *palace of the ſovereign*, *of the princes of the blood*, and *of the great men of his empire*, conſiſted in the profuſion of the metals that were laviſhed in decorating them. The temple of the Sun was diſtinguiſhed above all other edifices; its walls were incruſted or ſheathed with gold and ſilver, ornamented with divers figures, and loaded with the idols of all the nations whom the Incas had enlightened and ſubdued.

As it was not a ſolicitude for their own preſervation which occupied the Spaniards at firſt, they had no ſooner pillaged the immenſe riches which had been amaſſed at Cuſco for four centuries, than they went in great numbers in 1534, under the order of Sebaſtian de Benalcazar, to undertake the deſtruction of Quito. The other towns and boroughs of the empire were over-run with the ſame ſpirit of rapine; and the citizens and the temples were plundered in all parts.

Thoſe of the conquerors, who did not take up their reſidence in the ſettlements which they found already formed, built towns on the ſea-coaſts, where before there were none: for the ſterility of the ſoil had not permitted the Peruvians to multiply much there; and they had not been induced to remove thither from the extremity of their country, becauſe they ſailed very little. Paita, Truxillo, Callao, Piſca, and Arica, were the roads which the Spaniards deemed moſt convenient for the communication they intended to eſtabliſh among themſelves and with the mother-country. The different poſitions of theſe new cities determined the degree of their proſperity.

Thoſe which were afterwards built in the inland parts of the country were not erected in regions which preſented a fertile ſoil, copious harveſts, excellent paſtures, a mild and ſalubrious climate, and all the conveniencies of life. Theſe places, which had hitherto been ſo well cultivated by a numerous and flouriſhing people, were now totally diſregarded. Very ſoon they exhibited only a deplorable picture of a horrid deſert; and this wildneſs muſt have been more melancholy and hideous than the dreary aſpect of the earth before the origin of ſocieties. The traveller, who was led by accident or curioſity into theſe deſolate plains, could not forbear abhorring the barbarous and bloody authors of theſe devaſtations, while he reflected that it was not owing even to the cruel illuſions of glory and to the fanaticiſm of conqueſt, but to the ſtupid and abject deſire of gold, that they had ſacrificed ſo much more real treaſure, and ſo numerous a population.

This inſatiable thirſt of gold, which neither tended to ſubſiſtence, ſafety, nor policy, was the only motive for eſtabliſhing new ſettlements, ſome of which have been kept up, while ſeveral have decayed, and others have been formed in their ſtead. The fate of them all has correſponded with the diſcovery, progreſs, or declenſion, of the mines to which they were ſubordinate.

43 Manner of living of the natives.

Fewer errors have been committed in the means of procuring proviſions. The natives had hitherto lived hardly on any thing elſe but maize, fruits, and pulſe, for which they had uſed no other ſeaſoning except ſalt and pimento. Their liquors, which were made from different roots, were more diverſified: of theſe the chica was the moſt uſual; which is made from maze ſoaked in water, and taken out of the veſſel when it begins to ſprout. It is dried in the ſun, then parched a little, and at laſt ground. The flour, after it has been well kneaded, is put with water into large pitchers. The fermentation may be expected in two or three days, and muſt not continue longer. The great inconvenience of this drink, which, when uſed immoderately, infallibly intoxicates, is, that it will not keep more than eight days without turning ſour. Its taſte is nearly that of the moſt indifferent kind of cyder. It is a refreſhiug, nouriſhing, and aperitive liquor. The Indians, who are never troubled with ſuppreſſions of urine, are ſaid to owe that advantage to the uſe of this drink.

The conquerors were not ſatisfied either with the liquors or with the food of the people they had ſubdued. They imported vines from the Old World, which ſoon multiplied ſufficiently in the ſands of the coaſts at Ica, Piſca, Naſca, Moquequa, and Truxillo, to furniſh the colony with the wine and brandy it wanted. Olives ſucceeded ſtill better; and yielded a great abundance of oil, which was much ſuperior to that of the mother-country. Other fruits were tranſplanted with the ſame ſucceſs. Sugar ſucceeds ſo well, that none of any other growth can be compared to that which is cultivated in theſe parts, where it never rains. In the inland country wheat and barley were ſown; and at length all the European quadrupeds were ſoon found grazing at the foot of the mountains.

This was a conſiderable ſtep; but there ſtill remained much more to be done. After they had provided for a better and a greater choice of ſubſiſtence, the next care of the Spaniards was to have a dreſs more commodious and more agreeable than that of the Peruvians. Theſe were, however, better clothed than any other

American nation. They owed this ſuperiority to the advantage which they alone poſſeſſed, of having the LAMA and PACOS, domeſtic animals which ſerved them for this uſe. See CAMELUS.

After the conqueſt, all the Indians were obliged to wear cloths. As the oppreſſion under which they groaned did not allow them to exerciſe their former induſtry, they contented themſelves with the coarſer cloths of Europe, for which they were made to pay an exorbitant price. When the gold and ſilver which had eſcaped the rapacity of the conquerors were exhauſted, they thought of re-eſtabliſhing their national manufactures. Theſe were ſome time after prohibited, on account of the deficiency which they occaſioned in the exports of the mother-country. The impoſſibility which the Peruvians found of purchaſing foreign ſtuffs and paying their taxes, occaſioned permiſſion to be given at the end of ten years for their re-eſtabliſhment. They have not been diſcontinued ſince that time, and have been brought to as great a degree of perfection as it was poſſible they could be under a continual tyranny.

44 anufac- ures, &c.

With the wool of the vicuna, a ſpecies of wild pacos, they make, at Cuzco and in its territory, ſtockings, handkerchiefs, and ſcarfs. Theſe manufactures would have been multiplied, if the ſpirit of deſtruction had not fallen on animals as well as on men. The ſame wool, mixed with that of the ſheep imported thither from Europe, which hath exceedingly degenerated, ſerves for carpets, and makes alſo tolerably fine cloth. Fleeces of inferior quality are employed in ſerges, druggets, and in all kinds of coarſe ſtuffs.

The manufactures ſubſervient to luxury are eſtabliſhed at Arequipa, Cuzco, and Lima. In theſe three towns is made a prodigious number of gold toys and plate, for the uſe of private perſons, and alſo for the churches. All theſe manufactures are but coarſely wrought, and mixed with a great deal of copper. We ſeldom diſcover more taſte in their gold and ſilver laces and embroideries which their manufactures alſo produce. This is not altogether the caſe in regard to their lace, which, when mixed with that of Europe, looks very beautiful. This laſt manufacture is commonly in the hands of the nuns, who employ in it the Peruvian girls, and the young Meſtees of the towns, who for the moſt part before marriage paſs ſome years in the convent.

Other hands are employed in painting and gilding leather for rooms, in making with wood and ivory pieces of inlaid work and ſculpture, and in drawing figures on the marble that is found at Cucuca, or on linen imported from Europe. Theſe different works, which are almoſt all manufactured at Cuzco, ſerve for ornaments for houſes, palaces, and temples: the drawing of them is not bad, but the colours are neither exact nor permanent. If the Indians, who invent nothing, but are excellent imitators, had able maſters and excellent models, they would at leaſt make good copyiſts. At the cloſe of the laſt century, ſome works of a Peruvian painter, named *Michael de St Jacques*, were brought to Rome; and the connoiſſeurs diſcovered marks of genius in them.

45 f the ines of old and ſil- er.

Though the Peruvians were unacquainted with coin, they knew the uſe of gold and ſilver; for they employed them in different kinds of ornaments. Independent of what the torrents and accident procured them of theſe metals, ſome mines had been opened of little depth. The Spaniards have not tranſmitted to us the manner in which theſe rich productions were drawn from the boſom of the earth. Their pride, which has deprived us of ſo much uſeful knowledge, undoubtedly made them think, that, in the inventions of a people whom they called *barbarous*, there was nothing that was worthy to be recorded.

The difference as to the manner in which the Peruvians worked their mines, did not extend to the mines themſelves. The conquerors opened them on all ſides. At firſt the gold mines tempted the avarice of the greater number. Fatal experience diſcouraged thoſe whom paſſion had not blinded. They clearly ſaw, that, for ſome enormous fortunes raiſed in this manner, great numbers, who had only moderate fortunes, were totally ruined. Theſe mines ſunk into ſuch diſcredit, that, in order to prevent them from being abandoned, the government was obliged to take the 20th part of their produce, inſtead of the fifth which it at firſt received.

The mines of ſilver were more common, more equal, and richer. They even produced ſilver of a ſingular ſpecies, rarely found elſewhere. Towards the ſea-coaſt, great lumps of this metal are found in the ſands.

There are a great number of other mines which are infinitely more important, and are found in the rocks and on the mountains. Several of them gave falſe hopes. Such, in particular, was that of Ucuntaya, diſcovered in 1713. This was only an incruſtation of almoſt maſſive ſilver, which at firſt yielded ſeveral millions, but was ſoon exhauſted.

Others which were deeper, have been alike deſerted. Their produce, though equal to what it was originally, was not ſufficient to ſupport the expence of working them, which augmented every day. The mines of Quito, Cuſco, and Arequipa, have experienced that revolution which awaits many of the reſt.

There are greater numbers of very rich mines which the waters have invaded. The diſpoſition of the ground, which from the ſummit of the Cordeleras goes continually ſhelving to the South Sea, muſt neceſſarily render theſe events more common at Peru than in other places. This inconvenience, which with greater care and ſkill might often have been prevented or diminiſhed, has been in ſome inſtances remedied.

Joſeph Salcedo, about the year 1660, had diſcovered, not far from the town of Puna, the mine of Laycacota. It was ſo rich, that they often cut the ſilver with a chiſel. Proſperity had ſo elevated the mind of the proprietor, that he permitted all the Spaniards who came to ſeek their fortune in this part of the New World, to work ſome days on their own account, without weighing or taking any account of the preſents he made them. This generoſity drew around him an infinite number of people, whoſe avidity made them quarrel with each other, and the love of money made them take up arms and fall upon one another; and their benefactor, who had neglected no expedient to prevent and extinguiſh their ſanguinary contentions, was hanged as being the author of them. Whilſt he was in priſon, the water got poſſeſſion of his mine. Superſtition ſoon made it imagined that this was a puniſhment for the horrid act they had perpetrated againſt him. This idea of divine vengeance was revered for a long time; but at laſt, in 1740, Diego de Bacna aſſociated with other opulent people, to avert the ſprings which had deluged ſo much treaſure. The labours which this difficult undertaking required, were not finiſhed till 1754. The mine yields as much now as it did at firſt. But mines ſtill richer than this have been diſcovered. Such, for example, is that of Potoſi, which was found in the ſame country where the Incas worked that of Porco.

An Indian, named *Hualpa*, in 1545, purſuing ſome deer, in order to climb certain ſteep rocks laid hold of a buſh, the roots of which looſened from the earth, and brought to view an ingot of ſilver. The Indian had recourſe to it for his own uſe; and never failed to return to his treaſure every time that his wants or his deſires ſolicited him to it. The change that had happened in his fortune was remarked by one of his countrymen, and he diſcovered to him the ſecret. The two friends could not keep their counſel and enjoy their good fortune. They quarrelled; on which the indiſcreet confident diſcovered the whole to his maſter, Villaroell, a Spaniard who was ſettled in the neighbourhood. Upon this the mine became known, and was worked; and a great number of them were found in its vicinity; the principal of which are in the northern part of the mountain, and their direction is from north to ſouth. The moſt intelligent people of Peru have obſerved, that this is in general the direction of the richeſt mines.

The fame of what was paſſing at Potoſi ſoon ſpread abroad; and there was quickly built at the foot of the mountain, a town conſiſting of 60,000 Indians, and 10,000 Spaniards. The ſterility of the ſoil did not prevent its being immediately peopled. Corn, fruit, flocks, American ſtuffs, European luxuries, arrived there from every quarter. Induſtry, which every where follows the current of money, could not ſearch for it with ſo much ſucceſs as at its ſource. It evidently appeared ed that in 1738 theſe mines produced annually near 978,000l. without reckoning the ſilver which was not regiſtered, and what had been carried off by fraud. From that time the produce has been ſo much diminiſhed, that no more than one-eighth part of the coin which was formerly ſtruck is now made.

The mines of Potoſi, and all the mines of South America, in purifying their gold and ſilver, uſe mercury, with which they are ſupplied from Guança Velica. The common opinion is, that this mine was diſcovered in 1564. The trade of mercury was then ſtill free: it became an excluſive trade in 1571. At this period all the mines of mercury were ſhut; and that of Guança Velica alone was worked, the property of which the king reſerved to himſelf. It is not found to diminiſh. This mine is dug in a prodigiouſly large mountain, 60 leagues from Lima. In its profound abyſs are ſeen ſtreets, ſquares, and a chapel, where the myſteries of religion on all feſtivals are celebrated. Millions of flambeaux are continually kept to enlighten it.

Private people at their own expence work the mine of Guança Velica. They are obliged to deliver to government, at a ſtipulated price, all the mercury they extract from it. As ſoon as they have procured the quantity which the demands of one year require, the work is ſuſpended. Part of the mercury is ſold on the ſpot, and the reſt is ſent to the royal magazines throughout all Peru; from whence it is delivered out at the ſame price it is ſold for in Mexico. This arrangement, which has occaſioned many of the mines to drop, and prevented others from being opened, is inexcuſable in the Spaniſh ſyſtem. The court of Madrid, in this reſpect, merits the ſame reproaches as a miniſtry in other countries would incur, that would be blind enough to lay a duty on the implements of agriculture.

The mine of Guança Velica generally affects thoſe who work in it with convulſions: this and the other mines, which are not leſs unhealthy, are all worked by the Peruvians. Theſe unfortunate victims of an inſatiable avarice are crowded all together and plunged naked into theſe abyſſes, the greateſt part of which are deep, and all exceſſively cold. Tyranny has invented this refinement in cruelty, to render it impoſſible for any thing to eſcape its reſtleſs vigilance. If there are any wretches who long ſurvive ſuch barbarity, it is the uſe of cocoa that preſerves them.

PERUGIA, a town of Italy, in the pope's territories, and capital of Perugino. It is an ancient, handſome, populous, and large city, with a ſtrong citadel, an univerſity, and a biſhop's ſee. The churches, and many other buildings as well public as private, are very handſome. It is ſeated on a hill, in E. Long. 12. 26. N. Lat. 43. 6.

PERUGINO, a province of Italy, in the territory of the church, bounded on the weſt by Tuſcany, on the ſouth by Orvietano, on the weſt by the duchies of Spoleto and Urbino, and on the north by the county of Citra Caſtellana. It is one of the ſmalleſt provinces in the territory of the Church. The air is very pure, and the ſoil fertile in corn and good wine; beſides, the lake Perugia ſupplies them with plenty of fiſh. The capital town is Perugia. The lake is eight miles from the city, and is almoſt round, being about five miles in diameter; in it there are three iſlands. This province is about 25 miles in length, and near as much in breadth.

PERUVIAN BARK. See CINCHONA.

PESARO, a town of Italy, in the territory of the pope, and duchy of Urbino, with a biſhop's ſee. It is a large place, whoſe ſtreets are paved with bricks. The caſtle is very well fortified; the harbour excellent, and the cathedral church magnificent. The environs are remarkable for producing good figs, of which they ſend large quantities to Venice. It is ſeated on an eminence at the mouth of the river Fogha, on the gulph of Venice. E. Long. 13. 0. N. Lat. 43. 56.

PESCARA, a very ſtrong town in the kingdom of Naples, and in the Hither Abruzzo; ſeated at the mouth of a river of the ſame name, which falls into the Gulph of Venice. E. Long. 14. 20. N. Lat. 42. 22.

PESCHIERA, a ſmall but ſtrong town of Italy, in the Veroneſe, with a caſtle, and a ſtrong fort; ſeated on the river Mincio, or Menzo, which proceeds from the lake Garda. E. Long. 10. 37. N. Lat. 45. 23.

PESSARY, in medicine, a ſolid ſubſtance compoſed of wool, lint, or linen, mixed with powder, oil, wax, &c. made round and long like a finger, in order to be introduced into the exterior neck of the matrix,

trix, for the cure of ſeveral uterine diſorders.

PESTILENCE, in medicine, the ſame with the PLAGUE.

PETAL, in botany, one of the coloured leaves which compoſe the flower.

PETALISM, in antiquity, a kind of baniſhment at Syracuſe, by writing the perſon's name on a leaf; whence the name.

PETARD, in the art of war. See GUNNERY, n° 57. and Plate CXLI.

PETAU (Denis), or *Dionyſius* PETAVIUS, a French Jeſuit of great erudition, born at Orleans in 1583. He entered into the ſociety of Jeſuits in 1605; and did no little honour to it by his learning, which he employed in defending the Catholic church, by criticiſing and abuſing its adverſaries. Joſeph Scaliger was the perſon againſt whom he was the moſt inveterate; nor did he ſpare his friend Caſaubon when he came in his way. Petavius excelled particularly in the dark ſcience of chronology, the learned world in general being obliged to him for ſome exact and nice diſquiſitions on this ſubject. His chief work, which is in great repute to this day, he intitled, *Rationarum temporum*. It is an abridgement of univerſal hiſtory, from the earlieſt times to 1632, in chronological order, with references to proper authorities. It was improved, and ſeveral additions made to it, by Perizonius, and others after his death. He died in 1652.

PETECHIÆ, in medicine, a name given to thoſe ſpots, whether red or of any other colour, which appear in malignant fevers.

PETCHELI, a province of Aſia, in China, and the chief in the whole empire; bounded on the eaſt by the ſea, on the north by the great wall, on the weſt by Chanſi, and on the ſouth by Chantong and Honan. It contains Pekin, which is the principal city in the whole empire, and on which 140 towns depend, beſides a vaſt number of villages. The air is temperate, unleſs when the wind blows from the north; and there is a rainy ſeaſon in the latter end of July and the beginning of Auguſt, but it ſeldom rains any other time. The ſoil is fertile, and produces all ſorts of corn; and there are plenty of cattle, pulſe, and fruits. They have alſo mines of pit-coal, which is their only fuel. All the riches of China are brought into this province, particularly to Pekin, where the emperor reſides.

PETER, or *Epiſtles of St* PETER, two canonical books of the New Teſtamentf written by the apoſtle St Peter, and addreſſed to thoſe Jewiſh converts who were ſcattered throughout Pontus and Galatia, not only upon the perſecution raiſed at Jeruſalem, but upon former diſperſions of the Jews into thoſe places. The firſt of theſe epiſtles is principally deſigned to comfort and confirm them under thoſe fiery trials they were then ſubject to, and to direct them how to behave in the ſeveral ſtates and relations both in the civil and Chriſtian life. In the ſecond epiſtle, the apoſtle proſecutes the ſame ſubject, to prevent their apoſtaſy from the faith, and guard them againſt the corrupt principles of the Gnoſtics, and thoſe who ſcoffed at the promiſe of Chriſt's coming.

PETER (St), one of the apoſtles, was born at Bethſaida in Galilee, and was named *Simon*; but Chriſt having called him to be an apoſtle, changed his name into that of *Cephas*, which is the ſame with Peter: for as he was fiſhing on the lake of Genazereth with Andrew his brother, the Son of God ordered them to leave their nets and to follow him; and from that time they continued his diſciples. He was a witneſs to our Lord's transfiguration on the mount. He was preſent at the laſt ſupper; and was in the garden when the ſoldiers came to ſeize Jeſus, where, being tranſported with zeal, he drew his ſword and cut off the high-prieſt's ſervant's ear. But he ſoon after denied his knowing his Lord; and perſiſted in it three times, till the cock-crowing reminded him of Jeſus's having foretold this inſtance of his weakneſs; on which he ſhewed his repentance by his tears. St Peter was likewiſe a witneſs of Chriſt's reſurrection and aſcenſion, and of the deſcent of the Holy Ghoſt. He afterwards preached the goſpel with great zeal, converted 3000 perſons at his firſt ſermon, and performed many ſurpriſing miracles in proof of his divine miſſion. Some time after, Herod Agrippa cauſed him to be put in priſon at Jeruſalem, whence he was delivered by an angel. Dr Pearſon has proved, that this apoſtle was at Rome, where he met with Philo the Jew, with whom he contracted an intimate acquaintance. When Claudius baniſhed the Jews, he returned to Jeruſalem; and, ſome ſay, travelled thence into Africa, or, according to others, preached in Britain: that toward the latter end of Nero he returned to Rome, where he was crucified, and buried in the Vatican. Conſtantine the Great rebuilt and enlarged the Vatican in honour of St Peter, which at this day is one of the wonders of the world. He wrote two epiſtles, addreſſed to the converted Jews diſperſed throughout Aſia; but the other works attributed to St Peter are ſpurious.

PETER *of Blois*, a learned man of the 12th century, was born about the year 1120, at the city of Blois in France, from whence he derived his name. His parents being opulent, gave him a learned education. In his youth, when he ſtudied in the univerſity of Paris, he was exceſſively fond of poetry; and when he was a little further advanced in life, he became no leſs fond of rhetoric, to the ſtudy of which he applied with the greateſt ardour. From Paris he removed to Bononia in Italy, to acquire the civil and canon law; in the knowledge of both which he very much excelled. He appears from his writings to have cultivated medicine, and ſeveral branches of the mathematics, with no little care and ſucceſs. The ſtudy of theology was the chief delight and buſineſs of his life, in which he ſpent the greateſt part of his time, and made the greateſt progreſs. But unfortunately it was that ſcholaſtic theology, which conſiſted in vain attempts to prove and explain the many abſurd opinions which then prevailed in the church, by the ſubtleties of Ariſtotelian logic. In attempting to explain in this manner the moſt abſurd of all opinions that ever exiſted amongſt mankind, he was the very firſt perſon who employed the famous word *tranſubſtantiation*, which was ſoon after adopted by the church of Rome, and hath ever ſince made ſo great a noiſe. Being appointed preceptor to William II. king of Sicily in 1167, he obtained the cuſtody of the privy ſeal; and, next to the archbiſhop of Palermo, the prime miniſter, had the greateſt influence in all affairs. But his power was not of long duration: for the archbiſhop being baniſhed in 1168, our author ſoon after left the court of Sicily, and returned into France. He was not long, however, without a royal patron, being invited into England by Henry II. who employed him as his private ſecretary, made him archdeacon of Bath, and gave him ſome other benefices. When he had ſpent a few years at court, he conceived a diſguſt at that way of life, (of which he hath drawn a very unpleaſing picture in one of his letters), and retired into the family of Richard archbiſhop of Canterbury, who had made him his chancellor about the year 1176. In this ſtation he continued to the death of the archbiſhop in 1183, enjoying the higheſt degree of favour with that prelate, though he uſed much freedom in reproving him for his remiſsneſs in the government of the church. Our author remained in the ſame ſtation in the family of archbiſhop Baldwin, who ſucceeded Richard, acting both as his ſecretary and chancellor. He was alſo ſent by that prelate on an embaſſy to Rome in 1187, to plead his cauſe before Pope Urban III. in the famous controverſy between him and the monks of Canterbury about the church of Hackington. After the departure of his friend and patron Baldwin for the Holy Land in 1190, our author was involved in various troubles in his old age, the cauſes of which are not diſtinctly known; and died about the end of the 12th century. He appears from his works, which may be juſtly reckoned among the moſt valuable monuments of the age in which he flouriſhed, to have been a man of great integrity and ſincere piety, as well as of a lively inventive genius and uncommon erudition. His printed works conſiſt of 134 letters, which he collected together at the deſire of Henry II.; of 65 ſermons, delivered on various occaſions; and of 17 tracts on different ſubjects.

PETER *the Hermit*. See CRUSADE.

PETER I. juſtly ſtyled *Peter the Great*, czar, and afterwards emperor, of Ruſſia, founder of the Ruſſian empire; for though the country was well known, and of great antiquity, yet it had no extent of power, of political influence, or of general commerce in Europe, till his time. He was born in 1672; and was proclaimed czar when but ten years of age, in excluſion of John his elder brother, who, being of a ſickly conſtitution, was at the ſame time very weak in his underſtanding. The princeſs Sophia, his half-ſiſter, made an inſurrection in favour of John; and to put an end to the civil war, it was at laſt agreed that the two brothers ſhould jointly ſhare the imperial dignity. Peter had been very ill brought up, not only through the general defects of the Ruſſian education, but likewiſe through the arts of the princeſs Sophia, who ſurrounded him with every thing that might ſtifle his natural deſire of knowledge, deprave his mind, and enervate it with pleaſures. Notwithſtanding this, his inclination for military exerciſes diſcovered itſelf in his tendereſt years. He formed a company of 50 men, commanded by foreign officers, clothed and exerciſed after the German manner. He entered himſelf into the loweſt poſt, that of a drummer; and never roſe otherwiſe than as a ſoldier of fortune. Herein his deſign was to teach his nobility, that merit, not birth, was the only title to military employments. He reinforced his company with ſeveral others, till at laſt he had got together a conſiderable body of ſoldiers. As he then had no war on his hands, he exerciſed them in all ſorts of mock-engagements, and by this means ſecured to himſelf a body of well-diſciplined troops. The ſight of a Dutch veſſel, which he had met with on a lake belonging to one of his pleaſure-houſes, made ſuch an impreſſion on his mind, that he conceived the almoſt impracticable deſign of forming a navy. His firſt care was to get ſome Hollanders to build ſome ſmall veſſels at Moſcow; and he paſſed two ſucceſſive ſummers on board Engliſh or Dutch ſhips, which ſet out from Archangel, that he might inſtruct himſelf in every branch of naval affairs. In 1696 czar John died, and Peter was now ſole maſter of the empire. In 1698, he ſent an embaſſy to Holland; and went *incognito* in the retinue, and viſited England as well as Holland, in order to inform himſelf fully in the art of ſhip-building. At Amſterdam he worked in the yard as a private ſhip carpenter, under the name of *Peter Michaelof*; but he has been often heard to ſay, that if he had never gone to England, he had ſtill remained ignorant of that art. In 1700 he had got together a body of ſtanding forces, conſiſting of 30,000 foot, and now the vaſt project he had formed diſplayed itſelf in all its parts. He opened his dominions, which till then had been ſhut up, having firſt ſent the chief nobility of his empire into foreign countries to improve themſelves in knowledge and learning. He invited into Ruſſia all the foreigners he could meet with, who were capable of inſtructing his ſubjects in any manner, and offered them great encouragement to ſettle in his dominions. This raiſed many diſcontents; and the deſpotic authority he exerted on that occaſion was ſcarcely powerful enough to ſuppreſs them. In 1700, being ſtrengthened by the alliance of Auguſtus king of Poland, he made war on Charles XII. king of Sweden. His firſt ill ſucceſs did not deter him: for he uſed to ſay, I know that my armies muſt be overcome for a great while; but even this will at laſt teach them to conquer. He afterwards gained conſiderable advantages, and founded Peterſburg in 1703. In 1709 he gained a complete victory over the Swedes at Poltowa. In 1712, he was incloſed by the Turks on the banks of the Pruth; and ſeemed inevitably loſt, had not the Czarina Catherine bribed the grand vizier, and the czar's prudence completed his deliverance. In 1716, he made a tour through Germany and Holland, and viſited the royal academy of ſciences at Paris. It would be endleſs to enumerate all the various eſtabliſhments for which the Ruſſians are obliged to him: He formed an army according to the manner of the politeſt and moſt experienced nations: he fitted out fleets in all the four ſeas which border upon Ruſſia: he cauſed many ſtrong fortreſſes to be raiſed after the beſt plans; and made convenient harbours: he introduced arts and ſciences into his dominions, and freed religion from many ſuperſtitious abuſes: he made laws, built cities, cut canals, &c.; was generous in rewarding, impartial in puniſhing; faithful, laborious, and humble; yet was not free from a certain roughneſs of temper natural to his nation. He had indeed cured himſelf of exceſs in drinking; but he has been branded with ſeveral other vices, particularly cruelty. He publiſhed the unfortunate hiſtory of his ſon prince Alexei; towards whom ſome blame his ſeverity, while others think it no more than was neceſſary. He perfectly knew the honour due to perſons of merit; and not only heaped honours upon them during their life, but gave them marks of eſteem even after their death. He died of the ſtrangury in 1725, and left the world with the magnanimity of a hero and the piety of a Chriſtian.

Peter-*Pence*, and ancient tax of a penny on each houſe paid to the pope.—It was called *Peter-pence*, becauſe it was collectd on the day of St Peter *ad vincula*, and ſent to Rome; whence it was alſo called *Rome-ſcot* and *Rome-penny*.

PETERBOROUGH, a city of Northamptonſhire, with a biſhop's ſee, a market on Saturdays, and two fairs, on July 10. and October 2. for all ſort of ſtock, wrought timber and cheeſe. It is ſeated on the river Nen, over which there is a bridge that leads into Huntingdonſhire, in marſhy ground. It is not a large place, for it has but one pariſh-church beſides the cathedral; but the market-place is ſpacious, and the ſtreets are regular. It ſends two members to parliament. The cathedral was formerly a monaſtery; and is a majeſtic ſtructure, full of curious work, and has a large choir. W. Lon. 0. 15. N. lat. 52. 33.

PETERSBURG, a city of the province of Ingria in Ruſſia, and capital of the whole empire, ſituated in E. Long. 30. 23. N. Lat. 54. 56. It was founded in the year 1703 by Czar Peter the Great, whoſe ambition it was to have a fleet on the Baltic; for which reaſon he determined to found a city which might become the centre of trade throughout all his dominions. The ſpot he pitched upon was a low, fenny, uncultivated iſland, formed by the branches of the river Nieva, before they fall into the gulph of Finland. In the ſummer this iſland was covered with mud; and in winter became a frozen pool, rendered almoſt inacceſſible by dreary foreſts and deep moraſſes, the haunts of bears, wolves, and other ſavage animals. Having taken the fort of Nattebourg, and the town of Neiſchanz, in the year 1703, this mighty conqueror aſſembled in Ingria above 300,000 men, Ruſſians, Tartars, Coſſacks, Livonians, and others, even from the moſt diſtant parts of his empire, and laid the foundation of the citadel and fortifications, which were finiſhed in four months, almoſt in deſpite of nature. He was obliged to open ways through foreſts, drain bogs, raiſe dykes, and lay cauſeways, before he could pretend to found the new city. The workmen were ill provided with neceſſary tools and implements, ſuch as ſpades, pick-axes, ſhovels, planks, and wheel-barrows: they were even obliged to fetch the earth from a great diſtance in the ſkirts of their garments, or in little bags made of old mats and rags ſewed together. The had neither huts nor houſes to ſhelter them from the ſeverity of the weather: the country, which had been deſolated by war, could not accommodate ſuch a multitude with proviſions; and the ſupplies by the lake Ladoga were often retarded by contrary winds. In conſequence of theſe hardſhips, above 100,000 men are ſaid to have periſhed: nevertheleſs the work proceeded with incredible vigour and expedition; while Peter, for the ſecurity of his workmen, formed a great camp, in ſuch a manner, that his infantry continued in Finland, and his cavalry were quartered in Ingria. Some Swediſh cruizers being deſcried in the neighbourhood, the Czar poſted a body of troops in the iſle of Rutzari, by whom the Swedes were repulſed, and the work met with no farther interruption. The buildings of the city kept pace with the fortreſs, which is the centre of the town, ſurrounded on all ſides by the Nieva; and, in little more than a year, above 30,000 houſes were erected. At preſent there may be about double that number in Peterſburg, tho' many of them are paultry and inconſiderable. In order to people this city, Peter invited hither merchants, artificers, mechanics, and ſeamen, from all the different countries of Europe: he demoliſhed the town of Nieuſchants, and brought hither not only the materials of the houſes, but the inhabitants themſelves. A thouſand families were drawn from Moſcow; he obliged his nobility to quit their palaces and their villas in and about Moſcow, and take up their reſidence at Peterſburg, in a much more cold and comfortleſs climate. Finally, reſolving to remove hither the trade of Archangel, he iſſued an ordonnance, importing, That all ſuch merchandiſe as had been conveyed to Archangel, in order to be ſold to foreigners, ſhould now be ſent to Peterſburg, where they ſhould pay no more than the uſual duties. Theſe endeavours and regulations have rendered this one of the greateſt and moſt flouriſhing cities in Europe. The Ruſſian boyars and nobility have built magnificent palaces, and are now reconciled to their ſituation. At firſt many houſes were built of timber; but theſe being ſubject to ſudden conflagrations in ſpite of all the precautions that could be taken, the Czar, in the year 1714, iſſued an order, that all new houſes ſhould be walled with brick and covered with tiles. The fort is an irregular hexagon, with oppoſite baſtions. This, together with all the reſt of the fortifications, was in the beginning formed of earth only; but in the ſequel they were faced with ſtrong walls, and provided with caſemates, which are bomb-proof. In the curtain of the fort, on the right-hand ſide, is a noble diſpenſary, well ſupplied with excellent medicines, and enriched with a great number of porcelain vaſes from China and Japan. From one of gates of the fort a draw-bridge is thrown over an arm of the river, in which the Czar's galleys and other ſmall veſſels are ſheltered in the winter. The moſt remarkable building within the fort is the cathedral, built by the direction of an Italian architect. Peterſburg is partly built on little iſlands, ſome of which are connected by draw-bridges; and partly on the continent. In the higheſt part, on the bank of the Nieva, the Czar fixed his habitation, or ordinary reſidence, built of free-ſtone, and ſituated ſo as to command a proſpect of the greater part of the city. Here likewiſe is a royal foundery; together with the ſuperb houſes of many noblemen. The marſhy ground on which the city is built, being found extremely ſlippery, dirty, and incommodious, the Czar ordered every inhabitant to pave a certain ſpace before his own door. In the year 1716, Peter, taking a fancy to the iſland Waſili-Oſterno, which he had given as a preſent to prince Menzikoff, reſumed the grant, and ordered the city to be extended into this quarter. He even obliged the boyars, or nobles, to build ſtone houſes on this ſpot, though they were already in poſſeſſion of others on the ſide of Ingria: accordingly this is now the moſt magnificent part of the city. On the other ſide of a branch of the Nieva ſtands the Czar's country or ſummer palace, provided with a fine garden and orangery. On the bank of the ſame river is the ſlaboda, or ſuburbs, in which the Germans generally chooſe their habitation. Peterſburg is very much ſubject to dangerous inundations. In the year 1715, all the baſtions and draw-bridges were either overwhelmed, or carried away. The breadth, depth, and rapidity of the Nieva, have rendered it extremely difficult, if not impracticable, to join the iſlands and the continent by bridges. Beſides, Peter was averſe to this expedient for another reaſon: reſolved to accuſtom his ſubjects to navigation, he not only rejected the project of a bridge; but alſo ordered, that no boat ſhould paſs between the iſlands and continent, except by the help of ſails only. In conſequence of this ſtrange regulation, many lives were loſt: but at length he gained his point; and by habituating his ſluggiſh Muſcovites to the dangers of the ſea, in a little time produced a breed of hardy ſailors. The adjacent country is ſo barren, that the town muſt be ſupplied with proviſions from a great diſtance; conſequently they are extremely dear. Here are woods in plenty, conſiſting of pine, fir, alder, birch, poplar, and elm; but the oak and the beech are generally brought from Caſan. In winter the weather is extremely cold, and hot in the ſummer. In June the length of the night does not exceed three hours, during which the natives enjoy a continued twilight: but in December the ſun is not viſible more than three hours above the horizon.

The Czar Peter, who was indefatigable in his endeavours to improve and civilize his ſubjects, neglected nothing which he thought could contribute to theſe purpoſes. He condeſcended even to inſtitute and regulate aſſemblies at Peterſburg: theſe were opened at five in the afternoon, and the houſe was ſhut at ten: between theſe hours the faſhionable people of both ſexes met without ceremony, danced, converſed, or played either at cards or at cheſs, this laſt being a favourite diverſion among the Ruſſians. There was likewiſe an apartment ſet apart for drinking brandy and ſmoking tobacco. Plays and operas were likewiſe introduced for the ſame purpoſes; but as Peter had little reliſh, and leſs taſte, for thoſe entertainments, they were performed in a very aukward manner in his life-time: however, ſince his death, theſe performances have been brought to a greater degree of art and decorum.

This great northern legiſlator eſtabliſhed, in the neighbourhood of Peterſburg, manufactures of linen, paper, ſaltpetre, ſulphur, gun-powder, and bricks, together with water-mills for ſawing timber. He inſtituted a marine academy, and obliged every conſiderable family in Ruſſia to ſend at leaſt one ſon or kinſman, between the ages of ten and eighteen, to this ſeminary, where he was inſtructed in navigation, learned the languages, was taught to perform his exerciſes, and to live under the ſevereſt diſcipline. To crown his other plans of reformation, he granted letters-patent for founding an academy, upon a very liberal endowment; and though he did not live to execute this ſcheme, his empreſs, who ſurvived him, brought it to perfection. It was modelled on the plans of the royal ſociety in London, and the academy of France. Mr Bullfinger opened it in the year 1726, with an eloquent ſpeech on the deſign and utility of an academy of ſciences; and the profeſſors, who have always diſtinguiſhed themſelves by their merit and erudition, publiſhed an annual collection of their tranſactions: a taſk the more eaſy, as they have the benefit of printing preſſes, well managed, at Peterſburg.

PETERSFIELD, a handſome town of Hampſhire in England, ſending two members to parliament. It is ſeated in W. Long. 1. 5. N. Lat. 51. 5.

PETERWARADIN, a fortified town in Sclavonia, and one of the ſtrongeſt frontier places the houſe of Auſtria has againſt the Turks, ſeated on the Danube between the Drave and the Save. E. Long. 20. 0. N. Lat. 45. 20.

PETIOLE, in botany, the ſlender ſtalks that ſupport the leaves of a plant.

PETIT, or **PETITE**, a French word ſignifying *little* or *ſmall*.

PETITE *Guerre*, denotes the operations of detached parties, and the war of poſts. See WAR, Part III.

PETIT *Sergeanty*. See SERGEANTY.

PETIT *Treaſon*. See TREASON.

PETIT (John Lewis), an eminent ſurgeon, born at Paris in 1674. He had ſo early an inclination to ſurgery, that Mr Littre, a celebrated anatomiſt, being in his father's houſe, he regularly attended that gentleman's lectures, from his being ſeven years of age. He was received maſter in ſurgery in the year 1700; and acquired ſuch reputation in the practice of that art, that in 1726 the king of Poland ſent for him to his court, and in 1734 the king of Spain prevailed on him to go into that kingdom. He reſtored the health of thoſe princes; and they endeavoured to detain him by offering him great advantages, but he choſe rather to return to France. He was received into the academy of ſciences in 1715; became director of the royal academy of ſurgery; made ſeveral important diſcoveries; and invented new inſtruments for the improvement of ſurgery. He died at Paris in 1750. He wrote an excellent Treatiſe on the Diſeaſes of the Bones, the beſt edition of which is that of 1723; and many learned Diſſertations in the Memoirs of the Academy of Sciences, and in the firſt volume of the Memoirs of Surgery.

PETITIO PRINCIPII, in logic, the taking a thing for true, and drawing concluſions from it as ſuch, when it is really falſe, or at leaſt wants to be proved before any inferences can be drawn from it.

PETITION, a ſupplication made by an inferior to a ſuperior, and eſpecially to one having juriſdiction. It is uſed for that remedy which the ſubject hath to help a wrong done by the king, who hath a prerogative not to be ſued by writ: In which ſenſe it is either general, That the king do him right; whereupon follows a general indorſement upon the the ſame, *Let right be done the party:* Or it is ſpecial, when the concluſion and indorſement are ſpecial, for this or that to be done, &c.

By ſtatute, the ſoliciting, labouring, or procuring the putting the hands or conſent of above twenty perſons to any petition to the king or either houſe of parliament, for alterations in church or ſtate, unleſs by aſſent of three or more juſtices of peace of the county, or a majority of the grand jury at the aſſizes or ſeſſions, &c. and repairing to the king or parliament

ment to deliver ſuch petition with above the number of ten perſons, is ſubject to a fine of 100 l. and three months impriſonment, being proved by two witneſſes, within ſix months, in the court of *B. R.* or at the aſſizes, &c. And if what is required by this ſtatute be obſerved, care muſt be taken that petitions to the king contain nothing which may be interpreted to reflect on the adminiſtration; for if they do, it may come under the denomination of a libel: and it is remarkable, that the petition of the city of London for the ſitting of a parliament was deemed libellous, becauſe it ſuggeſted that the king's diſſolving a late parliament was an obſtruction of juſtice; alſo the petition of the ſeven biſhops, ſent to the Tower by James II. was called a libel, &c. To ſubſcribe a petition to the king, *to frighten him into a change of his meaſures, intimating, that if it be denied many thouſands of his ſubjects will be diſcontented*, &c. is included among the contempts againſt the king's perſon and government; tending to weaken the ſame, and is puniſhable by fine and impriſonment.

PETITORY ACTION, in Scots law. See LAW, N° clxxxiii. 18. 20.

PETITOT (John), a curious painter in enamel, born at Geneva in 1607. He ſtudied the art with ſuch application, that he arrived to a degree of perfection that may almoſt be accounted inimitable. He was wonderfully patient in finiſhing his works, though he had the addreſs to conceal his labour: however, he only painted the heads and hands of the figures; the hair, grounds, and drapery, being executed by Bordier his brother-in-law. Theſe two artiſts had the credit of aſſociating and labouring together for fifty years, without the leaſt miſunderſtanding happening between them. It is aſſerted by an ingenious French writer, that Petitot and Bordier derived the knowledge of the moſt curious and durable colours proper for enamelling, from Sir Theodore Mayerne at London, who recommended Petitot to Charles I. He had the honour to paint the portraits of that monarch and the whole royal family, and continued in England until Charles's unhappy end: he then went to Paris, where he was highly favoured by Lewis XIV. and acquired an ample fortune. Being a Proteſtant, the revocation of the edict of Nantz obliged him to retire to Geneva; but ſettling ſoon after at Veray in the canton of Bern, he paſſed the remainder of his life in eaſe and affluence. He died in 1691; and had 17 children: of whom one took to painting, and ſettled at London, where he gained good reputation; but was much inferior to his father.

Petitot may be called the inventor of painting portraits in enamel. Though his friend Bordier made ſeveral attempts before him, and Sir Theodore Mayerne had facilitated the means of employing the moſt beautiful colours; yet Petitot completed the works, which under his hand acquired a ſoftneſs and livelineſs of colouring that will never change, and will ever render his works valuable. He made uſe of gold and ſilver plates, and ſeldom enamelled on copper. When he firſt came in vogue, his price was 20 louis's a head, which he ſoon raiſed to 40. It was his cuſtom to take a painter with him, who painted the picture in oil; after which Petitot ſketched out his work, which he always finiſhed after the life. When he painted the king of France, he took thoſe pictures for his copies that moſt reſembled him; and the king afterwards gave him a ſitting or two to finiſh his work.

PETRA, (Cæſar, Lucian), a town of Greece on the coaſt of Illyricum, near Dyrrhachium, and not far from the mouth of the river Panyaſus.—Another PETRA, (Livy); a town of Mædica, a diſtrict of Thrace, lying towards Macedonia; but in what part of Macedonia, he does not ſay.

PETRA, (Ptolemy), *Petræa* (Silius Italicus), *Petrina* (Italicus), in both which laſt *urbs* is underſtood; an inland town of Sicily, to the ſouth-weſt of Engyum. Now *Petraglia*, (Cluverius).

PETRA *Jecktael*, (2 Kings xiv.), a town of the Amalekites; near the Adſcenſus Scorpionis (Judg. i.) and the Valley of Salt in the ſouth of Judea: afterwards in the poſſeſſion of the Edomites, after deſtroying the Amalekites.

PETRA *Recem*, or *Rekem*, ſo called from Rekem king of the Midianites, ſlain by the Iſraelites, (Num. xxxi.) Formerly called *Arce*, now *Petra*; the capital of Arabia Petræa, (Joſephus). Ptolemy places it in Long. 66. 45. from the Fortunate Iſlands, and Lat. 30. 20. It declines therefore 80 miles to the ſouth of the parallel of Jeruſalem, and 36 miles, more or leſs, from its meridian to the eaſt. Joſephus ſays, that the mountain on which Aaron died ſtood near Petra; which Strabo calls the capital of the Nabatæi; at the diſtance of three or four days journey from Jericho. This Petra ſeems to be the Sela of Iſaiah xvi. 1. and xlii. 11. the Hebrew name of *Petra* "a rock:" Though ſome imagine Petra to be no older than the time of the Macedonians.

PETRARCH (Francis), a celebrated Italian poet, was born at Arezzo in 1304, and was the ſon of Petrarco di Parenzo. He ſtudied grammar, rhetoric, and philoſophy, for four years at Carpentras; from whence he went to Montpelier, where he ſtudied the law under John Andreas and Cino of Piſtoia, and probably from the latter received a taſte for Italian poetry. As Petrarch only ſtudied the law out of complaiſance to his father, who on his viſiting him at Bologna had thrown into the fire all the Latin poets and orators except Virgil and Cicero, he, at 22 years of age, hearing that his father and mother were dead of the plague at Avignon, returned to that city to ſettle his domeſtic affairs, and purchaſed a country-houſe in a very ſolitary but agreeable ſituation, called *Vaucluſe*; where he firſt knew the beautiful Laura, with whom he fell in love, and whom he has immortaliſed in his poems. He at length travelled into France, the Netherlands, and Germany; and at his return to Avignon entered into the ſervice of Pope John XXII. who employed him in ſeveral important affairs. Petrarch was in hopes of being raiſed to ſome conſiderable poſts: but being diſappointed, he applied himſelf entirely to poetry; in which he met with ſuch applauſe, that in one and the ſame day he received letters from Rome and the chancellor of the univerſity of Paris, by which they invited him to receive the poetic crown. By the advice of his friends, he preferred Rome to Paris, and received that crown from the ſenate and people on the 8th of April 1341. His love of ſolitude at length induced him to return to Vaucluſe; but, after the death of the beautiful Laura, Provence became inſupportable to him, and he returned to Italy in 1352; when, being at Milan, Galeas Viceconti made him counſellor of ſtate. Petrarch ſpent almoſt all the reſt of his life in travelling to and from the different cities in Italy. He was archdeacon of Parma, and canon of Padua; but never received the order of prieſthood. All the princes and great men of his time gave him public marks of their eſteem; and while he lived at Arcqua, three miles from Padua, the Florentines deputed Boccace to go to him with letters, by which they invited him to Florence, and informed him, that they reſtored to him all the eſtate of which his father and mother had been deprived during the diſſenſions between the Guelphs and Gibelines. He died a few years after at Arcqua, in 1374. He wrote many works that have rendered his memory immortal; theſe have been printed in four volumes folio. His life has been written by ſeveral authors.

PETRE, or SALT-PETRE, in chemiſtry. See NITRE.

PETREA, in botany, a genus of the angioſpermia order belonging to the didynamia claſs of plants. There is only one ſpecies, a native of New Spain. It riſes to the height of 15 or 16 feet, with a woody ſtalk covered with grey bark, ſending out ſeveral long branches. Theſe have a whiter bark than the ſtem, and are garniſhed with leaves at each joint, which, on the lower part of the branches, are placed by threes round them; but, higher up, they are rough, and have a rough ſurface. The flowers are produced at the ends of the branches, in looſe bunches nine or ten inches long, each flower ſtanding on a ſlender flower-ſtalk about an inch long: the empalement of the flower is compoſed of five narrow obtuſe leaves about an inch long, which are of a fine blue colour, and much more conſpicuous than the petals, which are white, and not more than half the length of the empalement. The plant is propagated by ſeeds procured from the places where they are natives, and of which very few are good; for though Dr Houſton, the diſcoverer of the plant, ſent parcels of ſeeds to ſeveral perſons in England, only two plants were produced from the whole. The ſeeds muſt be ſown in a good hot-bed; and when the plants come up, they ſhould all be planted in a ſeparate ſmall pot filled with light loamy earth, and plunged into a hot-bed of tanners bark, where they ſhould afterwards conſtantly remain.

PETREL, in ornithology. See PROCELLARIA.

PETRIDIA, in natural hiſtory, a genus of ſcrupi, of a plain, uniform texture; of no great variety of colours, and emulating the external form of pebbles.

PETRIFACTION, in phyſiology, denotes the converſion of wood, bones, and other ſubſtances, into ſtone.

The foſſile bodies found petrified are principally either of vegetable or animal origin; and are more or leſs altered from their original ſtate, according to the different ſubſtances they have lain buried among in the earth; ſome of them having ſuffered very little change, and others being ſo highly impregnated with cryſtalline, ſparry, pyritical, or other extraneous matter, as to appear mere maſſes of ſtone or lumps of the matter of the common pyrites; but they are generally of the external dimenſions, and retain more or leſs of the internal figure, of the bodies into the pores of which this matter has made its way.

The animal-ſubſtances thus found petrified are ſea-ſhells; the teeth, bony palates, and bones, of fiſh; the bones of land-animals, &c. Theſe are found variouſly altered, by the inſinuation of ſtony and mineral matter into their pores; and the ſubſtance of ſome of them is now wholly gone, there being only ſtony, ſparry, or other mineral matter remaining in the ſhape and form.

As to the manner in which petrifaction is accompliſhed, we know very little. It has been thought by many philoſophers, that this was one of the rare proceſſes of nature; and accordingly ſuch places as afforded a view of it, have been looked upon as great curioſities. However, it is now diſcovered, that petrifaction is exceedingly common; and that every kind of water carries in it ſome earthy particles, which being precipitated from it, become ſtone of a greater or leſſer degree of hardneſs; and this quality is moſt remarkable in thoſe waters which are much impregnated with ſelenitic matter. Of late, it has alſo been found by ſome obſervations on a petrifaction in Eaſt Lothian in Scotland, that iron contributes greatly to the proceſs: and this it may do by its precipitation of any aluminous earth which happens to be diſſolved in the water by means of an acid; for iron has the property of precipitating this earth, though it cannot precipitate the calcareous kind. The calcareous kinds of earth, however, by being ſoluble in water without any acid, muſt contribute very much to the proceſs of petrefaction, as they are capable of a great degree of hardneſs by means only of being joined with fixed air, on which depends the ſolidity of our common cement or mortar uſed in building houſes. See the articles CEMENT and MORTAR. See alſo SAND, SELENITES, ROCK, STONE, and WATER.

Vide Phil. Tranſ. v. 6 part 1. p. 3

PETROBRUSSIANS, in church-hiſtory, a religious ſect which aroſe in France and the Netherlands about the year 1126, ſo called from their leader Peter Bruys. They denied, that children, before the uſe of reaſon, can be juſtified by baptiſm. They alſo condemned all places of public worſhip, croſſes, &c. and are ſaid to have rejected the ſacrament of the euchariſt, and prayers for the dead.

PETROLEUM, or ROCK-OIL, is an extremely ſubtile and penetrating fluid, and is much the thinneſt of all the native bitumens. It is very light and very pellucid; but though equally bright and clear under all circumſtances, it is liable to a very great variety in its colour. It is naturally almoſt colourleſs, and in its appearance greatly reſembles the moſt pure oil of turpentine: this is called *white petroleum*, though it has no more colour than water. It is ſometimes tinged of a browniſh, reddiſh, yellowiſh, or faint greeniſh colour; but its moſt frequent colour is a mixture of the reddiſh and blackiſh, in ſuch a degree that it looks black when viewed behind the light, but purple when placed between the eye and a candle or window. It is of a pungent and acrid taſte; and of a very ſtrong and penetrating ſmell, which very much approaches to that of the diſtilled oil of amber. The white is moſt eſteemed. It is ſo very inflammable, that while it floats on the ſurface of the water, as it does in many parts of Italy, it takes fire at the approach of a candle.

Petroleum is found in rivers, in wells, and trickling down the ſides of hills along with little ſtreams of water. It ſhort, it is the moſt frequent of all the liquid bitumens, and is perhaps the moſt valuable of them all in medicine. It is to be choſen the pureſt, lighteſt, and moſt pellucid that can be had, ſuch as is of the moſt penetrating ſmell and is moſt inflammable.

It is principally uſed externally, in paralytic caſes, and in pains of the limbs.

Mr Bouldoc made ſeveral experiments with the white petroleum of Modena, an account of which he gave to the Paris academy.

It eaſily took fire on being brought near a candle, and that without immediately touching the flame; and when heated in any veſſel, it will attract the flame of a candle, though placed at a great height above the veſſel, and the vapour it ſends up taking fire, the flame will be communicated to the veſſel of heated liquor, and the whole will be conſumed. It burns in the water; and when mixed with any liquor ſwims on the ſurface of it, even of the higheſt rectified ſpirit of wine, which is $\frac{1}{7}$ heavier than pure petroleum. It readily mixes with all the eſſential oils of vegetables, as oil of lavender, turpentine, and the reſt, and ſeems very much of their nature: nor is this very ſtrange, ſince the alliance between theſe bodies is probably nearer than is imagined, as the eſſential oils of vegetables may have been originally mineral ones, and drawn up out of the earth into the veſſels of the plants.

Petroleum, when ſhaken, yields a few bubbles; but they ſooner ſubſide than in almoſt any other liquor, and the liquor reſumes its clear ſtate again almoſt immediately. This ſeems owing to the air in this fluid being very equally diſtributed to all its parts, and the liquor being compoſed of particles very evenly and nicely arranged.

This extenſibility of the oil is alſo amazing. A drop of it will ſpread over ſeveral feet of water, and in this condition it gives a great variety of colours; that is, the ſeveral parts of which this thin film is compoſed, act as ſo many priſms. The moſt ſevere froſt never congeals petroleum into ice; and paper wetted with it becomes tranſparent, as when wetted with oil; but it does not continue ſo, the paper becoming opake again in a few minutes, as the oil dries away.

Spirit of wine, which is the great diſſolvent of ſulphur, has no effect upon petroleum, not even with ever ſo long a digeſtion. It will not take fire with the dephlegmated acid ſpirits; as oil of cloves, and other of the vegetable eſſential oils do: and in diſtillation, either by balneum mariæ, or in ſand, it will neither yield phlegm nor acid ſpirit; but the oil itſelf riſes in its own form, leaving in the retort only a little matter, thick as honey, and of a browniſh colour.

Alonſo Barba, in his book of metals, gives a very melancholy inſtance of the power of petroleum of taking fire at a diſtance: he tells us, that a certain well, yielding petroleum on the ſurface of its water, being to be repaired, the workman took down into the well with him a lanthorn and a candle in it; there were ſome holes in the lanthorn, through which the petroleum at a conſiderable diſtance ſucked out the flame of the candle, and, taking fire, burſt up with the noiſe of a cannon, and tore the man to pieces.

The people of mount Ciaro, in Italy, have ſome years ſince found out a much eaſier way of finding pretroleum than that which they formerly had been uſed to. This mountain abounds with a ſort of greyiſh ſalt, which lies in large horizontal beds, mingled with ſtrata of clay, and large quantities of a ſpar of that kind called by the Germans *ſelenites*; which is the common ſort, that ferments with acids, and readily diſſolves in them, and calcines in a ſmall fire. They pierce theſe ſlates in a perpendicular direction till they find water; and the petroleum which had been diſperſed among the cracks of thoſe ſlates, is then waſhed out by the water, and brought from all the neighbouring places to the hole or well which they have dug, on the ſurface of the water of which it ſwims after eight or ten days. When there is enough of it got together, they lade it from the top of the water with braſs baſons, and it is then eaſily ſeparated from what little water is taken up with it. Theſe wells or holes continue to furniſh the oil in different quantities for a conſiderable time; and when they will yield no more, they pierce the ſlates in ſome other place.

Petroleum is never uſed among us; but the French give it internally in hyſteric complaints, and to their children for worms; ſome alſo give it from 10 to 15 drops in wine, for ſuppreſſions of the menſes. This, however, is rather the practice of the common people than of the faculty.

PETROMYZON, the LAMPREY, a genus of fiſhes belonging to the claſs of amphibia nantes. It has ſeven ſpiracula at the ſide of the neck, no gills, a fiſtula on the top of the head, and no breaſt or belly fins. There are three ſpecies, diſtinguiſhed by peculiaries in their back-fins. There are three ſpecies.

1. The marinus, or ſea-lamprey, is ſometimes found ſo large as to weigh four or five pounds. The mouth is round, and placed rather obliquely below the end of the noſe: the edges are jagged, which enables them to adhere the more ſtrongly to the ſtones, as their cuſtom is, and which they do ſo firmly as not to be drawn off without ſome difficulty. Mr Pennant mentions one weighing three pounds, which was taken out of the Eſk, adhering to a ſtone of 12 pounds weight, ſuſpended at its mouth, from which it was forced with no ſmall pains. There are in the mouth 20 rows of ſmall teeth, diſpoſed in circular orders, and placed far within. The colour is duſky, irregularly marked with dirty yellow, which gives the fiſh a diſagreeable look.

Lampreys are found at certain ſeaſons of the year in ſeveral of our rivers, but the Severn is the moſt noted for them. They are ſea-fiſh; but, like ſalmon, quit the ſalt waters, and aſcend the latter end of the winter, or beginning of ſpring, and after a ſtay of a few months return again to the ocean, a very few excepted. The beſt ſeaſon for them is in the months of March, April, and May; for they are more firm when juſt arrived out of the ſalt water than they are afterwards, being obſerved to be much waſted, and very flabby at the approach of hot weather. They are taken in nets along with ſalmon and ſhad, and ſometimes in weels laid in the bottom of the river. It has been an old cuſtom for the city of Glouceſter, annually, to preſent his majeſty with a lamprey pye, covered with a large raiſed cruſt. As the gift is made at Chriſtmas, it is with great difficulty the corporation can procure any freſh lampreys at that time, though they give a guinea a-piece for them, ſo early in the ſeaſon. They are reckoned a great delicacy, either when potted or ſtewed; but are a ſurfeiting food, as one of our monarchs fatally experienced, Henry I.'s death being occaſioned by a too plentiful meal of theſe fiſh. It appears, that, notwithſtanding this accident, they continued in high eſteem; for Henry IV. granted protections to ſuch ſhips as brought over lampreys for the table of his royal conſort.

Mr Pennant is of opinion, that the ancients were unacquainted with this fiſh; at leaſt, he ſays, it is certain, that which Dr Arbuthnot and other learned men render the word *lamprey*, is a ſpecies unknown in our ſeas, being the *murœna* of Ovid, Pliny, and others, for which we want an Engliſh name. This fiſh, the *lupus* (our baſſe), and the *myxo* (a ſpecies of mullet), formed that pride of Roman banquets, the *tripatinam*, ſo called, according to Arbuthnot, from their being ſerved up in a machine with three bottoms. The words *lampetra* and *petromyzon* are but of modern date, invented from the nature of the fiſh; the firſt *à lambendo petras*, the other from πετρος and μυσαω, becauſe they are ſuppoſed to lick or ſuck the rocks.

2. The fluviatilis, or leſſer lamprey, ſometimes grows to the length of 10 inches. The mouth is formed like that of the preceding. On the upper part is a large bifurcated tooth: on each ſide are three rows of very minute ones: on the lower part are ſeven teeth, the exterior of which on one ſide is the largeſt. The irides are yellow. As in all the other ſpecies, between the eyes, on the top of the head, is a ſmall orifice of great uſe to clear its mouth of the water that remains on adhering to the ſtones, for through that orifice it ejects the water in the ſame manner as cetaceous fiſh. On the lower part of the back is a narrow fin, beneath that riſes another, which at the beginning is high and angular, then grows narrow, ſurrounds the tail, and ends near the anus. The colour of the back is brown or duſky, and ſometimes mixed with blue; the whole under-ſide ſilvery. Theſe are found in the Thames, Severn, and Dee, are potted with the larger kind, and are by ſome preferred to it, as being milder taſted. Vaſt quantities are taken about Mortlake, and ſold to the Dutch for bait for their cod-fiſhery. Above 430,000 have been ſold in a ſeaſon at 40s. *per* 1000. Of late, about 100,000 have been ſent to Harwich for the ſame purpoſe. It is ſaid that the Dutch have the ſecret of preſerving them till the turbot fiſhery.

3. The bronchialis, or lampern, is ſometimes found of the length of eight inches, and about the thickneſs of a ſwan's quill; but they are generally much ſmaller. The body is marked with numbers of tranſverſe lines, that paſs croſs the ſides from the back to the bottom of the belly, which is divided from the mouth to the anus by a ſtrait line. The back fin is not angular like that of the former, but of an equal breadth. The tail is lanceolated, and ſhort at the end. They are frequent in the rivers near Oxford, particularly the Iſis; but not peculiar to that county, being found in others of the Engliſh rivers, where, inſtead of concealing themſelves under the ſtones, they lodge themſelves in the mud, and never are obſerved to adhere to any thing like other lampreys.

PETRONIUS ARBITER (Titus), a great critic and polite writer of antiquity, the favourite of Nero, ſuppoſed to be the ſame mentioned by Tacitus in the 16th book of his Annals. He was proconſul of Bithynia, and afterwards conſul, and appeared capable of the greateſt employments. He was, nevertheleſs, extremely voluptuous; for he ſpent the greateſt part of the day in ſleep, and the night in pleaſure and buſineſs. He was one of Nero's principal confidents, and in a manner the ſuperintendant of his pleaſures; for that prince thought nothing agreeable or delightful but what was approved by Petronius. The great favour ſhewn him drew upon him the envy of Tigellinus, another of Nero's favourites, who accuſed him of being concerned in a conſpiracy againſt the emperor; on which Petronius was ſeized, and being ſentenced to die, he from time to time cauſed his veins to be opened and cloſed again, entertaining himſelf the while in diſcourſing on poetry with his friends. He afterwards ſent to Nero a book ſealed up with his own hand, in which he deſcribed the debaucheries of that prince under borrowed names, and died in the year 65 or 66. There are ſtill extant a ſatire, and ſome other of his pieces, well written in Latin, but filled with indecencies; which occaſioned Petronius's being called *Autor puriſſimæ impuritatis*. There was found in the laſt century a fragment of his works at Traou, in Dalmatia. It is a folio manuſcript two fingers thick, in which is contained Trimalcio's ſupper; it made much noiſe among the learned, and occaſioned many diſputes for and againſt its authenticity.

PETROSA OSSA, in anatomy, a name given to the fourth and fifth bones of the cranium, called alſo *oſſa temporum*, and *oſſa ſquamoſa*; the ſubſtance whereof, as their firſt and laſt names expreſs, is ſquamoſe and very hard.

PETTY (Sir William), ſon of Anthony Petty a clothier, was born at Rumſey, a little haven-town in Hampſhire, in 1623; and while a boy took great delight in ſpending his time among the artificers there, whoſe trades he could work at when but twelve years of age. Then he went to the grammar-ſchool there: at 15, he was maſter of the Latin, Greek, and French tongues, and of arithmetic and thoſe parts of practical geometry and aſtronomy uſeful to navigation. Soon after, he went to Caen in Normandy, and Paris, where he ſtudied anatomy, and read Veſalius with Mr Hobbes. Upon his return to England, he was preferred in the king's navy. In 1643, when the war between the king and parliament grew hot, he went into the Netherlands and France for three years; and having vigorouſly proſecuted his ſtudies, eſpecially in phyſic, at Utrecht, Leyden, Amſterdam, and Paris, he returned home to Rumſey. In 1647, he obtained a patent to teach the art of double-writing for ſeventeen years. In 1648, he publiſhed at London "Advice to Mr Samuel Hartlib, for the advancement of ſome particular parts of learning." At this time he adhered to the prevailing party of the kingdom; and went to Oxford, where he taught anatomy and chemiſtry, and was created a doctor of phyſic. In 1650, he was made profeſſor of anatomy there; and ſoon after, a member of the college of phyſicians in London. The ſame year he became phyſician to the army in Ireland; where he continued till 1659, and acquired a great fortune. After the Reſtoration he was introduced to king Charles II. who knighted him in 1661.

In 1662, he publiſhed "A treatiſe of taxes and contributions." Next year he was greatly applauded in Ireland for his invention of a double-bottomed ſhip. He died at London of a gangrene in the foot, occaſioned by the ſwelling of the gout, in 1687. Beſides the works above-mentioned, he wrote a vaſt many others.

Petty, any thing little or diminutive, when compared with another.

Petty-*Bag*, an office in chancery; the three clerks of which record the return of all inquiſitions out of every county, and make all patents of comptrollers, gaugers, cuſtomers, &c.

Petty-*Fogger*, a little tricking ſolicitor or attorney, without either ſkill or conſcience.

Petty, or *Petit*, *Larceny*. See Larceny.

Petty-*Patees*, among confectioners, a ſort of ſmall pies, made of a rich cruſt filled with ſweet-meats.

Petty-*Singles*, among falconers, are the toes of a hawk.

Petty-*Tally*, in the ſea-language, a competent allowance of victuals, according to the number of the ſhip's company.

Petty, or *Petit*, *Treaſon*. See Treason.

PETUNSE, in natural hiſtory, one of the two ſubſtances whereof porcelain or china-ware is made. The petunſe is a coarſe kind of flint or pebble, the ſurface of which is not ſo ſmooth when broken as that of our common flint. See Porcelain.

PEUCEDANUM, or sulphur-wort; a genus of the digynia order, belonging to the pentandria claſs of plants. There are three ſpecies; none of which have any remarkable properties excepting the officinale, or common hogs-fennel, growing naturally in the Engliſh ſalt-marſhes. This riſes to the height of two feet, with channelled ſtalks, which divide into two or three branches, each crowned with an umbel of yellow flowers, compoſed of ſeveral ſmall circular umbels. The roots, when bruiſed, have a ſtrong fetid ſcent like ſulphur, and an acrid, bitteriſh, unctuous taſte. Wounded in the ſpring, they yield a conſiderable quantity of yellow juice, which dries into a gummy reſin, and retains the ſtrong ſmell of the root. This ſhould ſeem to be poſſeſſed of ſome medicinal virtues, but they have never been aſcertained with any preciſion. The expreſſed juice was uſed by the ancients in lethargic diſorders.

PEWIT, sea-crow, or *Mire-crow*, in ornithology. See Larus.

PEWTER, a factitious metal uſed in making domeſtic utenſils, as plates, diſhes, &c.—The baſis of the metal is tin; which is converted into pewter, by mixing at the rate of an hundred weight of tin with 15 pounds of lead and ſix pounds of braſs.—Beſides this compoſition, which makes the common pewter, there are other kinds, compounded of tin, regulus of antimony, biſmuth, and copper, in ſeveral proportions.

PEZRON (Paul), a very learned and ingenious Frenchman, born at Hennebon in Britany in 1639, and admitted into the order of Citeaux in 1660. He was a great antiquary, and was indefatigable in tracing the origin of the language of the Goths; the reſult of which was, that he was led to eſpouſe a ſyſtem of the world's being much more antient than modern chronologers have ſuppoſed. This he communicated to the public in a treatiſe printed at Paris in 1687, 4to. intitled *The antiquity of Time, reſtored and defended againſt the Jews and modern chronologers*. This book of Pezron's was extremely admired for the ingenuity and learning in it; yet cauſed no ſmall alarm among the religious, againſt whom he nevertheleſs defended his opinions. He went through ſeveral promotions, the laſt of which was the abbey of Charmoye, to which he was nominated by the king; and died in 1706.

PHÆACIA, one of the names of the iſland Corcyra, (Homer, Stephanus). *Phæaces* the people, (Ovid), noted for their indolence and luxury: hence Horace uſes *Phæax* for a perſon indolent and ſleek; and hence aroſe their inſolence and pride, (Ariſtotle). The iſland was famous for producing large quantities of the fineſt flavoured apples, (Ovid, Juvenal, Propertius).

PHÆDRUS, an ancient Latin writer, who compoſed five books of fables, in Iambic verſe. He was a Thracian; and was born, as there is reaſon to conclude, ſome years before Julius Cæſar made himſelf maſter of the Roman empire. How he came into the ſervice of Auguſtus is not known; but his being called *Auguſtus's freedman* in the title of the book, ſhows that he had been that emperor's ſlave. The fables of Phædrus are valued for their wit and good ſenſe, expreſſed in very pure and elegant language; and it is remarkable that they remained buried in libraries altogether unknown to the public, until they were diſcovered and publiſhed by Peter Pithou, or Pithœus, a learned French gentleman, toward the cloſe of the 16th century.

PHÆNOMENON, in philoſophy, denotes any remarkable appearance, whether in the heavens or earth, and whether diſcovered by obſervation or experiment.

PHAETON, in fabulous hiſtory, was the ſon of Apollo and of the nymph Clymene. He had a diſpute with Epaphus, the ſon of Jupiter and Io; when the latter, upbraiding him, ſaid, that he was not the ſon of Phœbus, but that his mother artfully made uſe of that pretence to cover her infamy. Phaeton, fired at this reproach, flew to his mother, and by her advice carried his complaint to Apollo, who received him with great tenderneſs, and ſwore by Styx to grant whatever he requeſted, as a proof of his acknowledging him for his ſon. The youth boldly aſked the direction of the chariot of the ſun for one day. His father, grieved and ſurpriſed at this demand, uſed all his arguments to diſſuade him from the raſh attempt; but all was in vain, and, being by his oath reduced to ſubmit to his obſtinacy, entruſted him with the reins, after he had directed him how to uſe them. The young adventurer was however ſoon ſenſible of his madneſs. He was unable to guide the fiery ſteeds; and looſing the reins, Jupiter, to prevent his conſuming the heavens and earth, ſtruck him with a thunder-bolt, and hurled him from his ſeat into the river Eridanus or Po. His ſiſters Phaethuſa, Lambetia, and Phæbe, lamenting his loſs upon its banks, were changed by the gods into black poplar trees; and Cycnus, king of Liguria, alſo grieving at his fate, was transformed into a ſwan.

PHAGEDÆNA, in medicine, denotes a corroding ulcer.

PHAGEDENIC medicines, thoſe uſed to eat off proud or fungous fleſh; ſuch as are all the cauſtics.

PHALÆNA, the Moth, in zoology, a genus of inſects belonging to the order of lepidoptera. The feelers are ſetaceous, and taper gradually towards the points; the wings are often bent backwards; and there are no leſs than 460 ſpecies.

All the creatures of this claſs are quiet by day, remaining fixed to the ſtalks or leaves of plants, except only ſome of the males, which are now and then found fluttering about in the woods in ſearch of the females; but as ſoon as night approaches, they all fly about. This diſpoſition is very remarkably implanted in their nature: for when kept ſhut up in boxes, they always remain quiet without changing place all day; but as ſoon as the ſun is about ſetting, they always begin to flutter about and fly as much as their priſon will permit them.

PHALANGIUM, in zoology, a genus of inſects belonging to the order of aptera. They have eight feet, two eyes on the top of the head placed very near each other, and other two on the ſides of the head; the feelers reſemble legs, and the belly is round. There are nine ſpecies.

PHALANX, in Grecian antiquity, a ſquare battalion, conſiſting of 8000 men, with their ſhields joined and pikes croſſing each other; ſo that it was next to impoſſible to break it.

PHALARIS, a remarkable tyrant, born at Crete, where his ambitious deſigns occaſioned his baniſhment; he took refuge in Agrigentum, a free city of Sicily, and there obtained the ſupreme power by ſtratagem. Two circumſtances have contributed to preſerve his name in hiſtory. His cruelty, in one act of which he gave an example of ſtrict juſtice. It is thus related: Perillus, a braſs founder at Athens, knowing the cruel diſpoſition of Phalaris, contrived a new ſpecies of puniſhment for him to inflict on his ſubjects. He caſt a brazen bull, bigger than the life, with an opening in the ſide, to admit the victims; who being ſhut up in the body, a fire was kindled under it to roaſt them to death; and the throat was ſo contrived, that their dying groans reſembled the roaring of a bull. The artiſt brought it to the tyrant, expecting a great reward. Phalaris admired the invention and workmanſhip, but ordered the inventor to be put into it to make the firſt trial. At laſt the tyrant was put to death by his own ſubjects. Some epiſtles are attributed to him, concerning the genuineneſs of which there was a diſpute in the laſt century between Mr Boyle and Dr Bentley.

Phalaris, or *Canary-graſs*; a genus of the digynia order, belonging to the triandria claſs of plants. There are ten ſpecies, of which the moſt remarkable are the canarienſis, or manured Canary-graſs; and the arundinacea, or reed Canary-graſs. Theſe are both natives of Britain. The firſt grows by the road-ſides; and is frequently cultivated for the ſake of the ſeeds, which are found to be the beſt food for the Canary and other ſmall birds. The ſecond grows on the banks of rivers. It is uſed for thatching ricks or cottages, and endures much longer than ſtraw. In Scandinavia they mow it twice a-year, and their cattle eat it. There is a variety of this cultivated in our gardens with beautifully ſtriped leaves. The ſtripes are generally green and white; but ſometimes they have a purpliſh caſt. **This is commonly called painted *lady-graſs*, or *ladies-treſſes*.**

PHALEREUS (Nepos), a village and port of Athens: this laſt neither large nor commodious, for which reaſon Themiſtocles put the Athenians on building the Piræeus; both joined to Athens by long walls. The Phalereus lay nearer the city, (Pauſanias). Demetrius Phalereus, the celebrated ſcholar of Theophraſtus, was of this place; to whom the Athenians erected above 300 ſtatues; which were afterwards deſtroyed by his enemies, on his flight to Ptolemy king of Egypt, (Strabo). Here Demoſthenes was wont to declaim, to accuſtom his voice to ſurmount the noiſe and roaring of the ſea, a juſt and lively emblem of popular aſſemblies.

PHALEUCIAN verse, in ancient poetry, a kind of verſe conſiſting of five feet, the firſt of which is a ſpondee, the ſecond a dactyl, and the three laſt trochees.

PHALLUS, the morel; a genus of the order of fungi, belonging to the cryptogamia claſs of plants. There are two ſpecies.

1. The eſculentus, or eſculent morel, is a native of Britain, growing in woods, groves, meadows, paſtures, &c. The ſubſtance, when recent, is wax-like and friable; the colour a whitiſh yellow, turning browniſh in decay; the height of the whole fungus, about four or five inches. The ſtalk is thick and clumſy, ſomewhat tuberous at the baſe, and hollow in the middle. The pileus is either round or conical; at a medium about the ſize of an egg, often much larger; hollow within; its baſe united to the ſtalk; and its ſurface cellular, or latticed with irregular ſinuſes. The magnified ſeeds are oval. It is much eſteemed at table both recent and dried, being commonly uſed as an ingredient to heighten the flavour of ragouts. We are informed by Gleditſch, that morels are obſerved to grow in the woods of Germany in the greateſt plenty in thoſe places where charcoal has been made. Hence the good women who collect them to ſell, receiving a hint how to encourage their growth, have been accuſtomed to make fires in certain places of the woods, with heath, broom, vaccinium, and other materials, in order to obtain a more plentiful crop. This ſtrange method of cultivating morels being however ſometimes attended with dreadful conſequences, large woods having been ſet on fire and deſtroyed by it, the magiſtrates thought fit to interpoſe his authority, and the practice is now interdicted.

2. The impudicus, ſtinking morel, or ſtinkhorns, is alſo a native of Britain, and found in woods and on banks. It ariſes from the earth under a veil or volva, ſhaped exactly like a hen's egg, and of the ſame colour, having a long fibrous radicle at its baſe. This egg-like valva is compoſed of two coats or membranes, the ſpace between which is full of a thick, viſcid, tranſparent matter, which, when dry, glues the coats together, and ſhines like varniſh. In the next ſtage of growth, the volva ſuddenly burſts into ſeveral lacerated permanent ſegments, from the centre of which ariſes an erect, white, cellular, hollow ſtalk, about five or ſix inches high and one thick, of a wax-like friable ſubſtance, and moſt fœtid cadaverous ſmell, conical at each end, the baſe inſerted in a white, concave, membranaceous turbinated cup, and the ſummit capped with a hollow, conical pileus, an inch long,

having a reticulated cellular ſurface, its baſe detached from the ſtalk, and its ſummit umbilicated, the umbilicus ſometimes perforated and ſometimes cloſed. The under ſide of this pileus is covered with a clear, viſcid, gelatinous matter, ſimilar to that found between the membranes of the volva; and under this viſcid matter, concealed in reticulated receptacles, are found the ſeeds, which when magnified appear ſpherical. As ſoon as the volva burſts, the plant begins to diffuſe its intolerable odours, which are ſo powerful and widely expanded, that the fungus may be readily diſcovered by the ſcent only, before it appears to the ſight. At this time, the viſcid matter between the coats of the volva grows turbid and fuſcous; and when the plant attains its full maturity, the clear viſcid ſubſtance in the pileus becomes gradually diſcoloured, putrid, and extremely fœtid, and ſoon afterwards turns blackiſh, and, together with the ſeeds and internal part of the pileus itſelf, melts away. The fetid ſmell then begins to remit, the fungus fades, and continues for a ſhort time ſapleſs and coriaceous, and at laſt becomes the food of worms. The cadaverous ſcent of this fungus greatly allures the flies; which, lighting upon the pileus, are entrapped in the viſcid matter, and periſh. We are informed by Gleditſch, that the vulgar people in Thuringia call the unopened volvæ by the ridiculous name of *ghoſts* and *dæmons eggs*; and that they collect and dry them either in the ſmoke or open air, and, when reduced to powder, uſe them in a glaſs of ſpirits as an aphrodiſiac.

PHANATIC, or FANATIC, a viſionary; one who fancies he ſees ſpectres, ſpirits, apparitions, or other imaginary objects, even when awake; and takes them to be real. See PHANTASY and FANATIC.

Such are phrenetics, necromancers, hypochondriac perſons, lycanthropi, &c. See PHRENETIC, HYPOCHONDRIAC, LYCANTHROPI.

Hence the word is alſo applied to enthuſiaſts, pretenders to revelation, new lights, prophecies, &c. See ENTHUSIAST, and SECOND-*Sight*.

PHANTASM, a term ſometimes uſed in a ſynonimous ſenſe with idea, or notion retained in the mind of an external object.

PHANTASY, or FANCY, the *Imagination*; the ſecond of the powers or faculties of the ſenſitive or rational ſoul, by which the ſpecies of objects received by the common ſenſe are retained, recalled, further examined, and either compounded or divided. See IMAGINATION.

Others define the *phantaſy* to be that internal ſenſe or power, whereby the ideas of abſent things are formed, and repreſented to the mind as if they were preſent. In melancholics and madmen this faculty is very ſtrong, repreſenting many extravagant and monſtrous things, and framing its images as lively as thoſe of ſenſation: whence the viſions and deceptions thoſe perſons are liable to.

PHARISEES, a famous ſect of the Jews, who diſtinguiſhed themſelves by their zeal for the traditions of the elders, which they derived from the ſame fountain with the written word itſelf; pretending that both were delivered to Moſes from Mount Sinai, and were therefore both of equal authority. From their rigorous obſervance of theſe traditions, they looked upon themſelves as more holy than other men: and therefore ſeparated themſelves from thoſe whom they thought ſinners or profane, ſo as not to eat or drink with them; and hence, from the Hebrew word *pharis*, which ſignifies to ſeparate, they had the name of *Phariſees* or *Separatiſts*.

Their pretences to extraordinary piety drew after them the common people, who held them in the higheſt eſteem ann veneration. They held a reſurrection from the dead, and the exiſtence of angels and ſpirits; but, according to Joſephus, this was no more than a Pythagorean reſurrection, that is, of the ſoul only, by its tranſmigration into another body, and being born anew with it. From this reſurrection they excluded all who were notoriouſly wicked, being of opinion that the ſouls of ſuch perſons were tranſmitted into a ſtate of everlaſting puniſhment; but as to leſſer crimes, they imagined that they were puniſhed in the bodies which the ſouls of thoſe who had committed them were ſent into. According to this notion it was, that Chriſt's diſciples aſked him concerning the blind man, "Who did ſin, the man or his parents, that he was born blind?" With the Eſſenes, they held abſolute predeſtination; and with the Sadducees, freewill: but how they reconciled theſe doctrines, we are nowhere informed.

PHARMACY

IS the art of compounding natural and artificial ſubſtances for the purpoſes of medicine, in ſuch a manner as is moſt ſuitable to the reſpective properties of each, and may beſt anſwer the indications of cure.

This art, which in ſome way or other muſt have been coeval with medicine itſelf, has for a long time been divided into the chemical and galenical. No rational principles of diſtinction, however, were preſerved; and thoſe which were ranked among the chemical medicines in one diſpenſatory, have been ranked among the galenical ones in another. Hence the London college rejected the diviſion altogether; and Dr Lewis reckons pharmacy, in its full extent, to be no other than a branch of chemiſtry; and the moſt ſimple pharmaceutical preparation is chemical, in as far as it has any dependance on the properties of its materials.

The theory of pharmacy therefore is the ſame with that of chemiſtry; as are alſo the operations, which remain to be diſcuſſed here only in as far as they are made ſubſervient to the medicinal art, diſtinct from that which is purely chemical. The objects of pharmacy, however, are much more limited than thoſe of chemiſtry: the latter comprehending, in the utmoſt latitude of the word, almoſt every ſubſtance in nature; while pharmacy regards only ſuch bodies in the vegetable, animal, and mineral kingdoms, as, by their effects on the human frame, tend to preſerve health, or to reſtore it when loſt.

PART I. ELEMENTS OF PHARMACY.

CHAP. I.

A general view of the Properties of medicinal ſubſtances, and their relations to one another.

SECT. I. *Of Vegetables.*

1. THE medicinal virtues of vegetables differ very conſiderably according to the different circumſtances of the plant, ſuch as its age, the ſeaſon of the year, and the ſoil in which it grows.

2. This is exemplified in herbs, ſome of which contain moſt odoriferous matter when young, while others have little or none till they have attained a conſiderable age:—In fruits, ſome of which contain an auſtere acid, afterwards changed into a ſweet by maturation; others, ſuch as the orange, at firſt contain a ſtrong aromatic, and then an acid:—In roots; ſome of which, during the ſummer, contain a thin watery juice; but, if wounded early in the ſpring, yield rich balſamic juices, concreting into ſolid gummy reſins, ſome of which, from our indigenous plants, are ſuperior to thoſe brought from foreign countries:—In aromatic and in fetid plants; the former of which grow ſtronger and more fragrant in open expoſures, dry ſoils, and fair warm ſeaſons; while the latter loſe their ſmell in ſuch circumſtances. Regard muſt therefore be had to theſe and other ſimilar circumſtances in the collecting of plants for medical purpoſes.

3. The different parts of the ſame plant are very often different in quality from one another. Thus, the leaves and flowers of wormwood are intenſely bitter, while the root is aromatic. The capſule incloſing the ſeeds of poppy has a narcotic virtue, but the ſeeds themſelves have none.

4. The active parts of vegetables are generally capable of being extracted, without any alteration of their qualities, by ſome operations of a very ſimple nature; but by others, of a nature ſeemingly as ſimple, their nature may be entirely changed. The operations of fermentation, and of fire, are of this nature; for by means of them, the products of vegetables may be converted into ſubſtances having quite different properties from what they have naturally. Of the changes produced by theſe operations we ſhall therefore now take notice.

Art. 1. *Of the Changes produced in Vegetables, or their Juices, by Fermentation.*

5. ALL juices, or infuſions, which are either ſimply ſweet, or have a ſweetneſs mixed with acidity, throw off by fermentation a great quantity of groſs feculent matter; and are converted into a *vinous liquor*, affording by diſtillation an inflammable ſpirit.

6. The effects of the products juſt now mentioned on the human body are directly oppoſite to thoſe of the juices from which they were produced. The latter attenuate the animal fluids, and relax the ſolids, in ſuch a manner as in ſome caſes to prove uſeful aperient medicines, and, if taken to too great exceſs, to produce dangerous fluxes; but the former always thicken the fluids, and conſtringe the ſolids.

7. In conſequence of the different qualities of the juices or infuſions, there are differences among the vinous liquors produced from them; but the ſpirit, when pure, is always found to be the ſame, from whatever ſubſtance it is produced.

8. Beſides the groſs matter thrown off during the fermentation, there is ſeparated from ſeveral wines an acid ſaline ſubſtance named *tartar;* of a reddiſh or white colour, according to the wine which produces it. The red colour is not eſſential to the ſalt; for red tartar may be purified by ſolution in water, and then the tartar of all wines is found to be the ſame.

9. In fermentation there is alſo ſeparated from the fermenting ſubſtance a great quantity of incoercible vapour, formerly known by the name of *gas*, but now diſcovered to be one of the component parts of our atmoſphere, and the ſame with that which is called *fixed air;* concerning which ſee the articles AIR, FIXED *Air*, GAS, &c.

10. Many ſubſtances, not ſuſceptible of fermentation by themſelves, may yet be brought into that ſtate by an admixture of artificial ferments, or even of thoſe which admit of a ſpontaneous fermentation, together with a proper quantity of water. This method is ſometimes followed with vegetable matters intended for diſtillation, on a ſuppoſition that a ſlight fermentation will unlock their texture, and give out their principles more freely than otherwiſe; but it is much to be doubted whether this is really the caſe. The operation of fermentation is the ſame from firſt to laſt; and if its laſt effects are to convert the whole, or a great part, of the eſſential oil and ſaline parts of the vegetable into ardent ſpirit, it may reaſonably be thought that its firſt effects muſt be to convert a part of theſe ſubſtances into the ſame ſpirit. At any rate, it is univerſally agreed, that when fermentation is employed with the abovementioned view, it muſt be continued only for a very ſhort time.

11. The juices of fruits, though very ſuſceptible of fermentation in their natural ſtate, yet, when boiled till they become thick, are found to be indiſpoſed to ferment; and this not only in their thick ſtate, but when diluted again with water; though there appears to be ſcarcely any other alterations produced in them by the boiling. Hence liquids, prone to fermentation, may thus be preſerved. How far this diminution of their fermentability may affect their medical virtues, is not as yet clear.

12. The degree of the ſpecies of fermentation, by which wines and inflammable ſpirits are produced, is called *vinous fermentation.* If the proceſs is further protracted, more groſs matter is thrown off, and new changes ſucceed, but in a ſlower and leſs tumultuary manner than before. The heating inebriating wine becomes by degrees a cooling acid vinegar, which ſeems to counteract the effects of the other: the more the wine abounded with inflammable ſpirit, the more does the vinegar abound with uninflammable acid.

There are, however, certain qualities of vegetables, which are not completely ſubdued even by this ſecond ſtage of fermentation; ſome vinegars being apparently ly more coloured, and containing more of an oily and viſcid matter than others. By adding to the fermentable liquor ſubjects of other kinds, the qualities both of wines and vinegars may be ſtill further diverſified, ſo as to adapt them to particular medicinal uſes.

13. It is obſervable, that though the acetous fermentation will always ſucceed the vinous, unleſs induſtriouſly prevented, yet it is not always preceded thereby; for many, perhaps all, fermentable liquors may be made to paſs to the acetous ſtate, without any intermediate period of true vinoſity.

14. If the proceſs is ſtill further continued, further changes takes place. The matter putrefies: and at length what little liquor remains unevaporated, is found to be mere water, and the ſolid ſubſtance at the bottom appears to be the ſame with common mould.

15. This is reckoned by the chemiſts one of the ſtages of fermentation, and diſtinguiſhed by the name of the *putrefactive ſtage:* it is far more general in its object than the other two; every vegetable matter being ſuſceptible of putrefaction, but ſome particular kinds only being adapted to vinous or acetous fermentation.

16. Putrefaction diſcovers one difference in vegetables, which ſeems worthy of being remarked. The generality of vegetables rot and turn to mould, without yielding any very offenſive ſmell from the beginning to the end of the reſolution: but there are ſome which emit, throughout the whole proceſs, a ſtrong fetor, very nearly of the ſame kind with that which accompanies the putrefaction of animal-ſubſtances. See the articles FERMENTATION and PUTREFACTION.

Art. 2. *Productions from Vegetables by Fire.*

17. FIRE, the other grand agent in the reſolution of bodies, produces in vegetables decompoſitions of a different kind. Its general effects are the following.

18. Vegetable ſubſtances, burnt in the open air, are reduced partly into aſhes, and partly into flame and ſmoke; which laſt, condenſed in long canals, forms a nauſeous black ſoot. In the burning of moſt vegetables, an acid vapour accompanies the ſmoke; but the ſoot is never found to partake of it.

19. Vegetables urged with a red heat in cloſe veſſels (the veſſel containing the ſubject being made to communicate with another placed beyond the action of the fire for receiving the matters forced out by the heat) give over a watery liquor called *phlegm*; an acid liquor called *ſpirit;* an elaſtic incoercible vapour, which appears to be partly fixed and partly inflammable *air*, and to which an exit muſt be occaſionally allowed leſt it burſt the veſſels or blow off the receiver; a thin *oil*, at length a very thick dark-coloured oil, both which are of an acrimonious taſte, and a burnt fetid ſmell, whence they are called *empyreumatic oils*. There remains behind a black *coal*, not diſſoluble in any kind of liquors, not ſuſceptible of putrefaction, not alterable by the moſt vehement degree of fire ſo long as the air is excluded, but which, on admitting air to it, burns without flaming, and with little or no ſmoke, and leaves a very ſmall quantity of white aſhes.

20. The white aſhes of vegetables, infuſed or boiled in water, impart to it a pungent ſaline ſubſtance, called *fixt alkaline ſalt*, which may be ſeparated in a ſolid form by evaporating the water. The remaining part of the aſhes, which is by far the largeſt in quantity, is a pure earth differing from that which is the reſult of putrefaction, in being readily diſſoluble by every acid liquor, while the other is not acted upon by any acid.

21. Such is the general analyſis of vegetables by fire. But there are ſome vegetables, which, as they ſeem to ſhew, during putrefaction, ſome analogy in their matter with that which conſtitutes animal-bodies, diſcover alſo a like analogy in the preſent reſolution; yielding little or no acid; and, inſtead of a fixt alkaline ſalt which remains in the aſhes, affording a volatile alkaline ſalt, which ariſes along with the aqueous and oily principles.

22. Alkaline ſalts, and acid or ſour ſubſtances, are looked upon as being oppoſite in their nature to one another. Moſt of the bodies which are diſſoluble in alkaline liquors, are precipitated or thrown out from the ſolution on the addition of an acid; and moſt of thoſe which are diſſoluble in acids, are in like manner precipitated by alkalies. If an acid and an alkali be directly mixed together, there generally enſues an efferveſcence or tumultuary diſcharge of air-bubbles, owing to the fixed air they contain; but if they are previouſly deprived of their fixed air, no efferveſcence takes place.

23. In all caſes, the alkali and acid uniting together, compoſe a new body, called a *neutral ſalt*, which has neither the ſourneſs of the one ingredient, nor the peculiar pungency of the other, and which will not diſſolve thoſe ſubſtances which either the acid or the alkali, ſeparately, would diſſolve.

24. To theſe characters it may be added, that alkaline ſalts change the colour of blue flowers or their infuſions, as of violets, to a green, and acids to a red; while the neutral compound, formed by the coalition of the two, makes no alteration in the colour.

25. It muſt be obſerved, however, that to change blue flowers to a green, is not univerſally a mark of alkalies, for ſome ſolutions of earthy bodies in acids have the ſame effect: theſe laſt may be diſtinguiſhed from alkalies, by adding to them a known alkali, which will immediately precipitate the earth, and form a neutral compound with the acid.

26. Fixed alkaline ſalts, perfectly purified, appear to be one and the ſame, whatever kind of vegetable they were produced from; thoſe of ſome marine plants excepted. In volatile alkalies, and in the pure earthy part of the aſhes, there appears to be, reſpectively, the like identity.

27. Empyreumatic oils differ ſomewhat in the degree of acrimony and fetidneſs, and the acid ſpirits differ in degree of ſtrength, or in the quantity of water they are diluted with; how far they may differ in any other reſpects is little known, theſe preparations having been rarely uſed or examined.

28. It may be obſerved, that the alkaline ſalts, both of the fixed and of the volatile kind, are entirely creatures of the fire, being ſeldom if ever found to exiſt naturally in any vegetable: the oil, doubtleſs, pre-exiſted in the ſubject, but owes its acrimony and fetidneſs

to the fire; for the moſt mild and inſipid oils receive the ſame qualities on being urged with the ſame degree of heat: the acid, which is likewiſe naturally contained in vegetable ſubjects, proves always tainted in the preſent proceſs with the ill ſmell and taſte of the oil that accompanies it; but whether the acid itſelf ſuffers any change in its nature, is unknown.

29. When chemiſtry began firſt to be formed into a rational ſcience, and to examine the component parts and internal conſtitution of bodies, it was imagined, that this reſolution of vegetables by fire, diſcovering to us all their active principles, unclogged and unmixed with one another, would afford the ſureſt means of judging of their medicinal powers. But, on proſecuting theſe experiments, it was ſoon found, that they were inſufficient for that end; that the analyſes of poiſonous and eſculent plants agreed often as nearly with one another as two analyſes of one plant: that by the action of a burning heat, the principles of vegetables are not barely ſeparated, but altered, tranſpoſed, and combined into new forms; inſomuch that it was impoſſible to know what form they exiſted in, and what qualities they were endowed with, before theſe changes and tranſpoſitions happened.

Art. 3. *Subſtances naturally contained in Vegetables, and ſeparable by Art without Alteration of their native Qualities.*

I. *Groſs oils* abound chiefly in the kernels of fruits, and in certain ſeeds; from which they are commonly extracted by expreſſion, and hence are diſtinguiſhed by the name of *expreſſed oils*. They are contained alſo in all the parts of all vegetables that have been examined, and may be forced out by vehemence of fire; but here their qualities are greatly altered in the proceſs by which they are extracted or diſcovered.

31. Theſe oils, in their common ſtate, are not diſſoluble either in vinous ſpirits or in water, though, by means of certain intermedia, they may be united both with one and the other. Thus a ſkilful interpoſition of ſugar renders them miſcible with water into what are called *lohochs* and *oily draughts;* by the intervention of gum or mucilage, they unite with water into a milky fluid; by alkaline ſalts they are changed into a ſoap, which is miſcible both with watery and ſpiritous liquors, and is perfectly diſſolved by the latter into an uniform tranſparent fluid. The addition of any acid to the ſoapy ſolution abſorbs the alkaline ſalt; and the oil, which of courſe ſeparates, is found to have undergone this remarkable change, that it now diſſolves, without any intermedium, in pure ſpirit of wine.

32. Expreſſed oils, expoſed to the cold, loſe greatly of their fluidity; ſome of them, in a ſmall degree of cold, congeal into a conſiſtent maſs. Kept for ſome time in a warm air, they become thin and highly rancid; their ſoft, lubricating, and relaxing quality, is changed into a ſharp acrimonious one: and in this ſtate, inſtead of allaying, they occaſion irritation; inſtead of obtunding corroſive humours, they corrode and inflame. Theſe oils are liable to the ſame noxious alteration while contained in the original ſubject; hence the rancidity which the oily ſeeds and kernels, as almonds, and thoſe called the *cold ſeeds*, are ſo liable to contract in keeping. Nevertheleſs, on triturating theſe ſeeds and kernels with water, the oil, by the intervention of the other matter of the ſubject, unites with the water into an emulſion or milky liquor, which, inſtead of growing rancid, turns ſour on ſtanding. The rancidity alſo to which the oils are ſubject, appears to be owing to the impurities contained in them; for pure oil is found to be quite incorruptible.

33. In the heat of boiling water, and even in a degree of heat as much exceeding this as the heat of boiling water does that of the human body, theſe oils ſuffer little diſſipation of their parts. In a greater heat, they emit a pungent vapour, ſeemingly of the acid kind; and when ſuffered to grow cold again, they are found to have acquired a greater degree of conſiſtence than they had before, together with an acrid taſte. In a heat approaching to ignition, in cloſe veſſels, greateſt part of the oil ariſes in an empyreumatic ſtate, a black coal remaining behind.

34. II. *Groſs ſebaceous matter*. From the kernels of ſome fruits, as that of the chocolate-nut, we obtain, inſtead of a fluid oil, a ſubſtance of a butyraceous conſiſtence; and from others, as the nutmeg, a ſolid matter as firm as tallow. Theſe concretes are moſt commodiouſly extracted by boiling the ſubject in water; the ſebaceous matter, liquefied by the heat, ſeparates and ariſes to the ſurface, and reſumes its proper conſiſtence as the liquor cools.

35. The ſubſtances of this claſs have the ſame general properties with expreſſed oils, but are leſs diſpoſed to become rancid in keeping than moſt of the common fluid oils.

36. III. *Eſſential oils* are obtained only from thoſe vegetables, or parts of vegetables, that are conſiderably odorous. They are the direct principle, in which the odour, and oftentimes the warmth, pungency, and other active powers of the ſubject, reſide; whence their name of *eſſences* or *eſſential oils*.

37. Eſſential oils unite with rectified ſpirit of wine, and compoſe with it one homogene tranſparent fluid; though ſome of them require for this purpoſe a much larger proportion of the ſpirit than others. Water alſo, though it does not diſſolve their whole ſubſtance, may be made to imbibe ſome portion of their more ſubtle matter, ſo as to become conſiderably impregnated with their flavour: by their admixture with ſugar, gum, the yolk of an egg, or alkaline ſalts, they are made totally diſſoluble in water. Digeſted with volatile alkalies, they undergo various changes of colour, and ſome of the leſs odorous acquire conſiderable degrees of fragrance; whilſt fixed alkalies univerſally impair their odour.

38. In the heat of boiling water, theſe oils totally exhale: and on this principle they are commonly extracted from ſubjects that contain them; for no other fluid that naturally exiſts in vegetables is exhalable by that degree of heat, except the aqueous moiſture, from which greateſt part of the oil is eaſily ſeparated. Some of theſe oils ariſe with a much leſs heat, a heat little greater than that in which water begins viſibly to evaporate. In their reſolution by a burning heat, they differ little from expreſſed oils.

39. Eſſential oils, expoſed for ſome time to a warm air, ſuffer an alteration very different from that which the expreſſed undergo. Inſtead of growing thin, rancid, and acrimonious, they gradually become thick, and at length harden into a ſolid, brittle concrete, with

a

a remarkable diminution of their volatility, fragrancy, pungency, and warm ſtimulating quality. In this ſtate they are found to conſiſt of two kinds of matter; a fluid oil, volatile in the heat of boiling water, and nearly of the ſame quality with the original oil; and of a groſſer ſubſtance which remains behind, not exhalable without a burning heat, or ſuch a one as changes its nature, and reſolves it into an acid, an empyreumatic oil, and a black coal.

40. The admixture of a concentrated acid inſtantly produces in eſſential oils a change nearly ſimilar to that which time effects. In making theſe kinds of commixtures, the operator ought to be on his guard; for when a ſtrong acid, particularly that of nitre, is poured haſtily into an eſſential oil, a great heat and ebullition enſue, and often an exploſion happens, or the mixture burſts into a flame. The union of expreſſed oils with acids is accompanied with much leſs conflict.

41. IV. *Concrete eſſential oil.* Some vegetables, as roſes and elecampane roots, inſtead of a fluid eſſential oil, yield a ſubſtance poſſeſſing the ſame general properties, but of a thick or ſebaceous conſiſtence. This ſubſtance appears to be of as great volatility and ſubtlety of parts as the fluid oils: it equally exhales in the heat of boiling water, and concretes upon the ſurface of the collected vapour. The total exhalation of this matter, and its concreting again into its original conſiſtent ſtate, without any ſeparation of it into a fluid and a ſolid part, diſtinguiſhes it from eſſential oils that have been thickened or indurated by age or by acids.

42. V. *Camphor.* This is volatile like eſſential oils, and ſoluble both in oils and inflammable ſpirits: it unites freely with water by the intervention of gum, but very ſparingly and imperfectly by the other intermedia that render oils miſcible with watery liquors. It differs from the ſebaceous as well as fluid eſſential oils, in ſuffering no ſenſible alteration from long keeping; in being totally exhalable, not only by the heat of boiling water, but in a warm air, without any change or ſeparation of its parts, the laſt particle that remains unexhaled appearing to be of the ſame nature with the original camphor; in its receiving no empyreumatic impreſſion, and ſuffering no reſolution, from any degree of fire to which it can be expoſed in cloſe veſſels, though readily combuſtible in the open air; in being diſſolved by concentrated acids into a liquid form; and in ſeveral other properties which it is needleſs to ſpecify in this place.

43. VI. *Reſin.* Eſſential oils, indurated by age or acids, are called *reſins*. When the indurated maſs has been expoſed to the heat of boiling water, till its more ſubtle part, or the pure eſſential oil that remained in it, has exhaled, the groſs matter left behind is likewiſe called *reſin*. We find in many vegetables reſins analogous both to one and the other of theſe concretes; ſome containing a ſubtle oil, ſeparable by a heat of boiling water; others containing nothing that is capable of exhaling in that heat.

44. Reſins in general diſſolve in rectified ſpirit of wine, though ſome of them much more difficultly than others: it is chiefly by means of this diſſolvent that they are extracted from the ſubjects in which they are contained. They diſſolve alſo in oils, both expreſſed and eſſential; and may be united with watery liquors by means of the ſame intermedia which render the fluid oils miſcible with water. In a heat leſs than that of boiling water, they melt into an oily fluid; and in this ſtate they may be incorporated one with another. In their reſolution by fire, in cloſe veſſels, they yield a manifeſt acid, and a large quantity of empyreumatic oil.

45. VII. *Gum* differs from the foregoing circumſtances in being uninflammable: for though it may be burnt to a coal, and thence to aſhes, it never yields any flame. It differs remarkably alſo in the proportion of the principles into which it is reſolved by fire; the quantity of empyreumatic oil being far leſs, and that of acid far greater. In the heat of boiling water, it ſuffers no diſſipation; nor does it liquefy like reſins; but continues unchanged, till the heat is ſo far increaſed as to ſcorch or turn it to a coal.

46. By a little quantity of water it is ſoftened into a viſcous adheſive maſs, called *mucilage*: by a larger quantity it is diſſolved into a fluid, which proves more or leſs glutinous according to the proportion of gum. It does not diſſolve in vinous ſpirits, or in any kind of oil; nevertheleſs, when ſoftened with water into a mucilage, it is eaſily miſcible both with the fluid oils and with reſins, which by this means become ſoluble in watery liquors along with the gum, and are thus excellently fitted for medicinal purpoſes.

47. As oily and reſinous ſubſtances are thus united to water by the means of gum, ſo gums may in like manner be united to ſpirit of wine by the intervention of reſins and eſſential oils; though the ſpirit does not take up near ſo much of the gum as water does of the oil or reſin.

48. Acid liquors, though they thicken pure oils, or render them conſiſtent, do not impede the diſſolution of gum, or of oils blended with gum. Alkaline ſalts, on the contrary, both fixed and volatile, though they render pure oils diſſoluble in water, prevent the ſolution of gum, and of mixtures of gum and oil. If any pure gum be diſſolved in water, the addition of any alkali will occaſion the gum to ſeparate, and fall to the bottom in a conſiſtent form: if any oily or reſinous body was previouſly blended with the gum, this alſo ſeparates, and either ſinks to the bottom, or riſes to the top, according to its gravity.

49. VIII. *Gum-reſin.* By gum-reſin is underſtood a mixture of gum and reſin. Many vegetables contain mixtures of this kind, in which the component parts are ſo intimately united, with the interpoſition perhaps of ſome other matter, that the compound, in a pharmaceutical view, may be conſidered as a diſtinct kind of principle; the whole maſs diſſolving almoſt equally in aqueous and in ſpirituous liquors; and the ſolutions being not turbid or milky, like thoſe of the groſſer mixtures of gum and reſin, but perfectly tranſparent. Such is the aſtringent matter of biſtort root, and the bitter matter of gentian.

50. IX. *Saline matter.* Of the ſaline juices of vegetables there are different kinds; the ſweet and the acid ones are the moſt plentiful, and thoſe which are the moſt known.

51. Theſe juices, expoſed to a heat equal to that of boiling water, ſuffer generally no other change than the evaporation of their watery moiſture; the ſaline matter remaining behind, along with ſuch of the other

not volatile parts as were blended with it in the juice; from many, after the exhalation of great part of the water, the ſaline matter gradually ſeparates in keeping, and concretes into little ſolid maſſes, leaving the other ſubſtances diſſolved, or in a moiſt ſtate; from others, no means have yet been found of obtaining a pure concrete ſalt.

52. Theſe ſalts diſſolve not only in water like other ſaline bodies, but many of them, particularly the ſweet, in rectified ſpirit alſo. The groſs oily and gummy matter with which they are almoſt always accompanied in the ſubject, diſſolves freely along with them in water, but is by ſpirit in great meaſure left behind. Such heterogeneous matters as the ſpirit takes up are almoſt completely retained by it, while the ſalt concretes; but of thoſe which water takes up, a conſiderable part always adheres to the ſalt. Hence eſſential ſalts, as they are called, prepared in the common manner from the watery juices of vegetables, are always found to partake largely of the other ſoluble principles of the ſubject; whilſt thoſe extracted by ſpirit of wine prove far more pure. By means of rectified ſpirit, ſome productions of this kind may be excellently freed from their impurities; and perfect ſaccharine concretions be obtained from many of our indigenous ſweets.

53. There is another kind of ſaline matter, obtained from ſome reſinous bodies, particularly from benzoin, of a different nature from the foregoing, and ſuppoſed by ſome of the chemiſts to be a part of the eſſential oil of the reſin, coagulated by an acid, with the acid more predominant or more diſengaged than in the other kinds of coagulated or indurated oils. Theſe concretes diſſolve both in water and in vinous ſpirits, though difficultly and ſparingly in both: they ſhow ſome marks of acidity, have a conſiderable ſhare of ſmell like that of the reſin they are obtained from, exhale in a heat equal to that of boiling water, or a little greater, and prove inflammable in the fire.

General obſervations on the foregoing principles.

54. 1ſt, Eſſential oils, as already obſerved, are obtainable only from a few vegetables, and camphor from a much ſmaller number: but groſs oil, reſin, gum, and ſaline matter, appear to be common, in greater or leſs proportion, to all; ſome abounding more with one, and others with another.

55. 2dly, The ſeveral principles are in many caſes intimately combined, ſo as to be extracted together from the ſubject by thoſe diſſolvents, in which ſome of them, ſeparately, could not be diſſolved. Hence watery infuſions, and ſpirituous tinctures of a plant, contain, reſpectively, more than water or ſpirit is the proper diſſolvent of.

56. 3dly, After a plant has been ſufficiently infuſed in water, all that ſpirit extracts from the reſiduum may be looked upon as conſiſting wholly of ſuch matter as directly belongs to the action of ſpirit. And contrariwiſe, when ſpirit is applied firſt, all that water extracts afterwards may be looked upon as conſiſting only of that matter of which water is the direct diſſolvent.

57. 4thly, If a vegetable ſubſtance, containing all the principles we have been ſpeaking of, be boiled in water, the eſſential oil, whether fluid or concrete, and the camphor and volatile eſſential ſalt, will gradually exhale with the ſteam of the water, and may be collected by receiving the ſteam in proper veſſels placed beyond the action of the heat. The other principles not being volatile in this degree of heat, remain behind; the groſs oil and ſebaceous matter float on the top; the gummy and ſaline ſubſtance, and a part of the reſin, are diſſolved by the water, and may be obtained in a ſolid form by ſtraining the liquor, and expoſing it to a gentle heat till the water has exhaled. The reſt of the reſin ſtill retained by the ſubject may be extracted by ſpirit of wine, and ſeparated in its proper form by exhaling the ſpirit. On theſe foundations moſt of the ſubſtances contained in vegetables may be extracted, and obtained in a pure ſtate, however they may be compounded together in the ſubject. By this operation, however, ſome very conſiderable change is undoubtedly produced by the fire; ſince, by pouring back the liquor which has ariſen in diſtillation upon that which remains in the ſtill, we ſhall never be able to recompoſe a liquor like that before it was diſtilled.

58. 5thly, Sometimes one or more of the principles is found naturally diſengaged from the others, lying in diſtinct receptacles within the ſubject, or extravaſated and accumulated on the ſurface. Thus, in the dried roots of angelica, cut longitudinally, the microſcope diſcovers veins of reſin. In the flower-cups of hypericum, and the leaves of the orange-tree, tranſparent points are diſtinguiſhed by the naked eye, which, on the firſt view, ſeem to be holes; but, on a cloſer examination, are found to be little veſicles filled with eſſential oil. In the bark of the fir, pine, larch, and ſome other trees, the oily receptacles are extremely numerous, and ſo copiouſly ſupplied with the oily and reſinous fluid, that they frequently burſt, eſpecially in the warm climates, and diſcharge their contents in great quantities. The acacia tree in Egypt, and the plum and cherry among ourſelves, yield almoſt pure gummy exudations. From a ſpecies of aſh is ſecreted the ſaline ſweet ſubſtance manna; and the only kind of ſugar which the ancients were acquainted with, appears to have been a natural exudation from the cane.

59. 6thly, The foregoing principles are, ſo far as is known, all that naturally exiſt in vegetables; and all that art can extract from them, without ſuch operations as change their nature, and deſtroy their original qualities. In one or more of theſe principles, the colour, ſmell, taſte, and medicinal virtues of the ſubject, are almoſt always found concentrated.

60. 7thly, In ſome vegetables, the whole medicinal activity reſides in one principle. Thus, in ſweet almonds, the only medicinal principle is a groſs oil; in horſe-radiſh root, an eſſential oil; in jalap-root, a reſin, in marſhmallow-root, a gum; in the leaves of ſorrel, a ſaline acid ſubſtance.

61. 8thly, Others have one kind of virtue reſiding in one principle, and another in another. Thus Peruvian bark has an aſtringent reſin and a bitter gum; wormwood, a ſtrong-flavoured eſſential oil, and a bitter gum-reſin.

62. 9thly, The groſs inſipid oils and ſebaceous matters, the ſimple inſipid gums, and the ſweet and acid ſaline ſubſtances, ſeem nearly to agree in their medi-

cinal qualities, as well as in their pharmaceutic properties.

63. 10thly, But eſſential oils, reſins, and gum-reſins, differ greatly in different ſubjects. As eſſential oils are univerſally the principle of odour in vegetables, it is obvious that they muſt differ in this reſpect as much as the ſubjects from which they are obtained. Reſins frequently partake of the oil, and conſequently of the differences depending thereon; with this further diverſity, that the groſs reſinous part often contains other powers than thoſe which reſide in oils. Thus from wormwood a reſin may be prepared, containing not only the ſtrong ſmell and flavour, but likewiſe the whole bitterneſs of the herb; from which laſt quality the oil is entirely free. The bitter, aſtringent, purgative, and emetic virtues of vegetables, reſide generally in different ſorts of reſinous matter, either pure, or blended with gummy and ſaline parts; of which kind of combinations there are many ſo intimate, that the component parts can ſcarcely be ſeparated from one another, the whole compound diſſolving almoſt equally in aqueous and ſpirituous menſtrua.

64. 11thly, There are ſome ſubſtances alſo which, from their being totally diſſoluble in water, and not at all in ſpirit, may be judged to be mere gums; but which, nevertheleſs, poſſeſs virtues never to be found in the ſimple gums. Such are the aſtringent gum called *acacia*, and the purgative gum extracted from aloes.

65. 12thly, It is ſuppoſed that vegetables contain certain ſubtle principles or preſiding ſpirits, different in different plants, of too great tenuity to be collected in their pure ſtate, and of which oils, gums, and reſins, are only the matrices or vehicles. This inquiry is foreign to the purpoſes of pharmacy, which is concerned only about groſſer and more ſenſible objects. When we obtain from an odoriferous plant an eſſential oil, containing in a ſmall compaſs the whole fragrance of a large quantity of the ſubject, our intentions are equally anſwered, whether the ſubſtance of the oil be the direct odorous matter, or whether it has diffuſed through it a fragrant principle more ſubtle than itſelf. And when this oil, in long keeping, loſes its odour, and becomes a reſin, it is equal, in regard to the preſent conſiderations, whether the effect happens from the avolation of a ſubtle principle, or from a change produced in the ſubſtance of the oil itſelf.

Sect. II. *Animals.*

66. In animal-bodies we find certain ſubſtances which have a great reſemblance, in their general properties, to thoſe of the vegetable kingdom.

67. Animal oils and fats, like the groſs oils of vegetables, are not of themſelves diſſoluble either in water or vinous ſpirits: but they may be united with water by the intervention of gum or mucilage; and moſt of them may be changed into ſoap, and thus rendered miſcible with ſpirit, as well as water, by fixt alkaline ſalts.

68. The odorous matter of ſome odoriferous animal-ſubſtances, as muſk, civet, caſtor, is, like eſſential oils, ſoluble in ſpirit of wine, and volatile in the heat of boiling water. Cartheuſer relates, that from caſtor an actual eſſential oil has been obtained, in very ſmall quantity, but of an exceedingly ſtrong diffuſive ſmell.

69. The veſicating matter of cantharides, and thoſe parts of ſundry animal-ſubſtances in which their peculiar taſtes reſide, are diſſolved by rectified ſpirit, and ſeem to have ſome analogy with reſins and gummy reſins.

70. The gelatinous principle of animals, like the gum of vegetables, diſſolves in water, but not in ſpirit or in oils; like gums alſo, it renders oils and fats miſcible with water into a milky liquor.

71. Some inſects, particularly the ant, are found to contain an acid juice which approaches nearly to the nature of vegetable acids.

72. There are, however, ſundry animal-juices, which differ greatly, even in theſe general kinds of properties, from the correſponding ones of vegetables. Thus animal-ſerum, which appears analogous to vegetable gummy juices, has this remarkable difference, that though it mingles uniformly with cold or warm water, yet, on conſiderably heating the mixture, the animal-matter ſeparates from the watery fluid, and concretes into a ſolid maſs. Some have been apprehenſive, that the heat of the body, in ſome diſtempers, might riſe to ſuch a degree as to produce this dangerous or mortal concretion of the ſerous humours: but the heat requiſite for this effect is greater than the human body appears capable of ſuſtaining, being nearly about the middle point between the greateſt human heat commonly obſerved and that of boiling water.

73. The ſoft and fluid parts of animals are ſtrongly diſpoſed to run into putrefaction; they putrefy much ſooner than vegetable matters, and when corrupted prove more offenſive.

74. This proceſs takes place, in ſome degree, in the bodies of living animals, as often as the juices ſtagnate long, or are prevented, by an obſtruction of the natural emunctories, from throwing off their more volatile and corruptible parts.

75. During putrefaction, a quantity of air is generated, all the humours become gradually thinner, and the fibrous parts more lax and tender. Hence the tympany which ſucceeds the corruption of any of the viſcera, or the imprudent ſuppreſſion of dyſenteries by aſtringents; and the weakneſs and laxity of the veſſels obſervable in ſcurvies, &c.

76. The craſſamentum of human blood changes by putrefaction into a dark livid-coloured liquor; a few drops of which tinge the ſerum of a tawny hue; like that of the ichor of ſores and dyſenteric fluxes, and of the white of the eye, the ſaliva, the ſerum of blood drawn from a vein, and that which oozes from a bliſter in deep ſcurvies, and in the advanced ſtate of malignant fevers.

77. The putrid craſſamentum changes a large quantity of recent urine to a flame-coloured water ſo common in fevers and in the ſcurvy. This mixture, after ſtanding an hour or two, gathers a cloud reſembling what is ſeen in the crude water of acute diſtempers, with ſome oily matter on the ſurface, like the ſcum which floats on ſcorbutic urine.

78. The ſerum of blood depoſits, in putrefaction, a ſediment reſembling well-digeſted pus, and changes to a faint olive green. A ſerum, ſo far putrefied as

to become green, is perhaps never to be ſeen in the veſſels of living animals; but in dead bodies this ſerum is to be diſtinguiſhed by the green colour which the fleſh acquires in corrupting. In ſalted meats, this is commonly aſcribed to the brine, but erroneouſly; for that has no power of giving this colour, but only of qualifying the taſte, and in ſome degree the ill effects, of corrupted aliments. In foul ulcers, and other ſores, where the ſerum is left to ſtagnate long, the matter is likewiſe found of this colour, and is then always acrimonious.

79. The putrefaction of animal-ſubſtances is prevented or retarded by all ſaline matters, even by the fixt and volatile alkaline ſalts, which have generally been ſuppoſed to produce a contrary effect. Of all the ſalts that have been made trial of, ſea-ſalt ſeems to reſiſt putrefaction the leaſt: in ſmall quantities, it even accelerates the proceſs. The vegetable bitters, as chamomile-flowers, are much ſtronger antiſeptics, not only preſerving fleſh long uncorrupted, but likewiſe ſomewhat correcting it when putrid: the mineral acids have this laſt effect in a more remarkable degree. Vinous ſpirits, aromatic and warm ſubſtances, moſt of the diaphoretic drugs, and the acrid plants falſely called *alkaleſcent*, as ſcurvy-graſs and horſe-radiſh, are alſo found to reſiſt putrefaction; and ſome of the abſorbent earths, as chalk, to promote it.

80. It is obſervable, that notwithſtanding the ſtrong tendency of animal-matters to putrefaction, yet broths made from them with the admixture of vegetables, inſtead of putrefying, turn ſour. Dr Pringle finds, that when animal-fleſh in ſubſtance is beaten up with bread or other farinaceous vegetables, and a proper quantity of water, into the conſiſtence of a pap, this mixture likewiſe, kept in a heat equal to that of the human body, grows in a little time ſour; whilſt the vegetable matters, without the fleſh, ſuffer no ſuch change. See the *Appendix* to his *Obſervations on the Diſeaſes of the Army*.

81. Animal-ſubſtances, burnt in the open air, are reſolved, like vegetables, into ſoot and aſhes; but with this difference, that no fixt alkaline ſalt can be obtained from the aſhes, and that no acid vapour accompanies the ſmoke. They emit, during the burning, a fetid ſmell of a peculiar kind, by which animal-ſubſtances may be diſtinguiſhed at once from all thoſe of the vegetable kingdom. In cloſe veſſels, they give over, after the watery moiſture, a volatile alkaline ſalt, which either concretes into a ſolid form, or diſſolves in the water, and thus compoſes what is called *ſpirit;* together with an empyreumatic oil, of a more fetid kind than the oils of vegetables, without the leaſt footſtep of acid throughout the whole proceſs. A black coal remains, which, in the open air, burns into white aſhes void of ſaline matter.

82. It was obſerved in the preceding ſection, that ſome few vegetables, in this reſolution of them by fire, diſcover ſome agreement in their matter with bodies of the animal kingdom, yielding a volatile alkaline ſalt in conſiderable quantity, with little or nothing of the acid or fixed alkali which the generality of vegetables afford. In animal-ſubſtances alſo there are ſome exceptions to the general analyſis: from animal-fats, inſtead of a volatile alkali, an acid liquor is obtained, and their empyreumatic oil wants the peculiar offenſiveneſs of the other animal-oils.

SECT. III. *Minerals.*

Art. 1. *Oils and Bitumens.*

83. In the mineral kingdom is found a fluid oil, called *napththa* or *petroleum*, floating on the ſurface of waters, or iſſuing from clefts of rocks, particularly in the eaſtern countries, of a ſtrong ſmell, very different from that of vegetable or animal oils, limpid almoſt as water, highly inflammable, not ſoluble in ſpirit of wine, and more averſe to union with water than any other oils.

84. There are different ſorts of theſe mineral oils, more or leſs tinged, of a more or leſs agreeable, and a ſtronger or weaker ſmell. By the admixture of concentrated acids, which raiſe no great heat or conflict with them, they become thick, and at length conſiſtent; and in theſe ſtates are called *bitumens*.

85. Theſe thickened or concreted oils, like the correſponding products of the vegetable kingdom, are generally ſoluble in ſpirit of wine, but much more difficultly, more ſparingly, and for the moſt part only partially: they liquefy by heat, but require the heat to be conſiderably ſtronger. In a proper degree of heat they give out a fluid oil, greatly reſembling the native petrolea, a ſmall quantity of a black coaly matter remaining behind. Their ſmells are various; but all of them, either in their natural ſtate, or when melted or ſet on fire, yield a peculiar kind of ſtrong ſcent, called, from them, *bituminous*.

Art. 2. *Earths.*

86. In treating of vegetables and animals, we forbore to ſpeak of their earthy matters, that the diſtinguiſhing characters of the ſeveral claſſes of earthy bodies might be the eaſier apprehended, by having them placed here in one ſynoptical view: the little impropriety, of joining the vegetable and animal earths to the mineral, muſt be overlooked for the ſake of that advantage. Under the mineral earths are included ſtones, theſe being no other than earths in an indurated ſtate. The different kinds of theſe bodies hitherto taken notice of, are the following.

I. *Earths ſoluble in the nitrous, marine, and vegetable acids, but not at all, or exceeding ſparingly, in the vitriolic acid. When previouſly diſſolved in other acids, they are precipitated by the addition of this laſt, which thus unites with them into inſipid, or nearly inſipid concretes, not diſſoluble in any liquor.* Of this kind are,

87. [1.] The mineral calcareous earth: *diſtinguiſhed by its being convertible, in a ſtrong fire without addition, into an acrimonious calx called* quicklime. This earth occurs in a variety of forms in the mineral kingdom. The fine ſoft chalk, the coarſer limeſtones, the hard marbles, the tranſparent ſpars, the earthy matter contained in waters, and which, ſeparating from them, incruſtates the ſides of caverns or hangs in icicles from the top, receiving from its different appearances different appellations; how ſtrongly ſoever ſome of theſe bodies have been recommended for particular medicinal purpoſes, are at bottom no other than different forms of this calcareous earth; ſimple pulverization depriving them of the ſuperficial characters by which they are diſtinguiſhed in the maſs. Moſt of them contain generally a greater or leſs admixture of ſome of

the indiſſoluble kinds of earth; which, however, affects their medicinal qualities no otherwiſe than by the addition which it makes to their bulk. Chalk appears to be one of the pureſt, and is therefore in general preferred. They all burn into a ſtrong quicklime: in this ſtate, a part of them diſſolves in water, which thus becomes impregnated with the aſtringent and lithontriptic powers that have been erroneouſly aſcribed to ſome of the earths in their natural ſtate.

88. [2.] The animal calcareous earth: *burning into quicklime, like the mineral.* Of this kind are oyſter-ſhells, and all the marine ſhells that have been examined; though with ſome variation in the ſtrength of the quicklime produced from them.

89. [3.] The earth of bones and horns: *not at all burning into quicklime.* This kind of earth is more difficult of ſolution in acids than either of the preceding. It is accompanied in the ſubject with a quantity of gelatinous matter, which may be ſeparated by long boiling in water, and more perfectly by burning in the open air: the earth may be extracted alſo from the bone or horn, though difficultly, by means of acids; whereas vegetables, and the ſoft parts of animals, yield their pure earth by burning only.

II. *Earths ſoluble with eaſe in the vitriolic as well as other acids; and yielding, in all their combinations therewith, ſaline concretes ſoluble in water.*

90. [1.] Magneſia alba: *compoſing with the vitriolic acid a bitter purgative liquor.*

91. [2.] Aluminous earth: *compoſing with the vitriolic acid a very aſtringent liquor.*

III. *Earths, which by digeſtion in acids, either in the cold or in a moderate warmth, are not at all diſſolved.*

92. [1.] Argillaceous earth: *becoming hard, or acquiring an additional hardneſs, in the fire.* Of this kind of earth there are ſeveral varieties, differing in ſome particular properties: as the purer *clays*, which when moiſtened with water form a very viſcous maſs, difficultly diffuſible through a large quantity of the fluid, and ſlowly ſubſiding from it; *boles*, leſs viſcous, more readily miſcible with water, and more readily ſubſiding; and *ochres*, which have nothing of the viſcoſity of the two foregoing, and are commonly impregnated with a yellow or red ferrugineous calx.

93. [2.] Cryſtalline earth: *naturally hard, ſo as to ſtrike ſparks with ſteel; becoming friable in a ſtrong fire.* Of this kind are flints, cryſtals, &c. which appear to conſiſt of one and the ſame earth, differing in the purity, hardneſs, and tranſparency of the maſs.

94. [3.] Gypſeous earth: *reducible by a gentle heat into a ſoft powder, which unites with water into a maſs, ſomewhat viſcous and tenacious while moiſt, but quickly drying and becoming hard. A greater heat deprives the powder of this property, without occaſioning any other alteration.* Such are the tranſparent *ſelenitæ*; the fibrous ſtony maſſes improperly called *Engliſh talc*; and the granulated gypſa, or plaſter of Paris ſtones.

95. [4.] Talky earth: *ſcarcely alterable by a vehement fire.* The maſſes of this earth are generally of a fibrous or leafy texture; more or leſs pellucid, bright, or glittering; ſmooth and unctuous to the touch; too flexible and elaſtic to be eaſily pulverized; ſoft, ſo as to be cut with a knife. In theſe reſpects ſome of the gypſeous earths greatly reſemble them: but the difference is readily diſcovered by fire; a weak heat reducing the gypſeous to powder, while the ſtrongeſt makes no other alteration in the talky, than ſomewhat diminiſhing their flexibility, brightneſs, and unctuoſity.

Art. 3. *Metals.*

96. Of metals, the next diviſion of mineral bodies, the moſt obvious characters are, their peculiar bright aſpect, perfect opacity, and great weight: the lighteſt of them is ſix, and the heavieſt upwards of 19 times heavier than an equal bulk of water.

97. They all melt in the fire, except platina; a metallic body which has not been applied to any medicinal uſe, and which is therefore excluded from this general view of medicinal ſubjects.

98. Gold and ſilver, how long ſoever they are continued in fuſion, remain unchanged and undiminiſhed. The others, if air is admitted to them, are gradually converted, with different degrees of facility, into a powdery or friable ſubſtance called *calx*, deſtitute of the metallic aſpect, and much lighter in proportion to its bulk than the metal itſelf. This change in their obvious properties is generally accompanied with a notable alteration in their medicinal virtues: thus quickſilver, which, taken into the body in its crude ſtate and undivided, ſeems inactive; when calcined by fire, proves, even in ſmall doſes, a ſtrong emetic and cathartic, and in ſmaller ones a powerful alterative in chronical diſorders; while regulus of antimony, on the contrary, is changed, by the ſame treatment, from a high degree of virulence to a ſtate of inactivity.

99. Calces of mercury and arſenic exhale in a heat below ignition: thoſe of lead and biſmuth, in a red or low white heat, run into a tranſparent glaſs: the others are not at all vitreſcible, or not without extreme vehemence of fire. Both the calces and glaſſes recover their metallic form and qualities again, by the ſkilful addition of any kind of inflammable ſubſtance that does not contain a mineral acid.

100. All metallic bodies diſſolve in acids; ſome only in particular acids, as ſilver and lead in the nitrous; ſome only in compoſitions of acids, as gold in a mixture of the nitrous and marine; and others, as iron and zinc, in all acids. Some likewiſe diſſolve in all alkaline liquors, as copper; and others, as lead, in expreſſed oils. Fuſed with a compoſition of ſulphur and fixed alkaline ſalt, they are all, except zinc, made ſoluble in water.

101. All metallic ſubſtances diſſolved in ſaline liquors have powerful effects in the human body, tho' many of them appear in their pure ſtate to be inactive. Their activity is generally in proportion to the quantity of acid combined with them: thus lead, which in its crude form has no ſenſible effect, when united with a ſmall portion of vegetable acid into ceruſs, diſcovers a low degree of the ſtyptic and malignant quality which it ſo ſtrongly exerts when blended with a larger quantity of the ſame acid, into what is called *ſaccharum ſaturni*: and thus mercury, with a certain quantity of the marine acid, forms the violent corroſive ſublimate, which, by diminiſhing the proportion of acid, becomes the mild medicine called *mercurius dulcis*.

Art. 4. *Acids.*

102. The mineral acids are diſtinguiſhed by the names of the concretes from which they have been prin-

cipally extracted; the *vitriolic* from vitriol, the *nitrous* from nitre or ſaltpetre, and the *marine* from common ſea-ſalt. They are all highly corroſive, inſomuch as not to be ſafely touched, unleſs largely diluted with water, or united with ſuch ſubſtances as obtund or ſuppreſs their acidity. Mixed haſtily with vinous ſpirits, they raiſe a violent ebullition and heat, accompanied with a copious diſcharge of noxious fumes: a part of the acid unites intimately with the vinous ſpirit into a new compound void of acidity, called *dulcified ſpirit*. It is obſervable, that the marine acid is much leſs diſpoſed to this union with ſpirit of wine than either of the other two: nevertheleſs, many of the compound ſalts reſulting from the combination of earthy and metallic bodies with this acid, are ſoluble in that ſpirit, while thoſe with the other acids are not. All theſe acids efferveſce ſtrongly with alkaline ſalts, both fixed and volatile; and form with them neutral ſalts, that is, ſuch as diſcover no marks either of an acid or alkaline quality.

103. We have already taken notice of two kinds of alkaline ſalt; the volatile alkali of animals, and the fixed alkali of vegetables. In the mineral kingdom, another ſpecies of fixed alkali, different in ſeveral reſpects from the vegetable, is found ſometimes in a detached ſtate, but more plentifully in combination with the marine acid, with which it compoſes ſea-ſalt. From the coalition of the different acids with theſe three alkalies, and with the ſeveral ſoluble earths and metallic bodies, reſult a variety of ſaline compounds, the principal of which will be particularized in the ſequel of this treatiſe.

104. The vitriolic acid, in its concentrated liquid ſtate, is much more ponderous than the other two, emits no viſible vapours in the heat of the atmoſphere, but imbibes moiſture there from, and increaſes in its weight: the nitrous and marine emit copious corroſive fumes, the nitrous yellowiſh red, and the marine white ones. If bottles containing the three acids are ſtopped with cork, the cork is found in a little time tinged black by the vitriolic, corroded into a yellow ſubſtance by the nitrous, and into a whitiſh one by the marine.

105. It is above laid down as a character of one of the claſſes of earths, that the vitriolic acid precipitates them when they are previouſly diſſolved in any other acid: it is obvious, that on the ſame principle this particular acid may be diſtinguiſhed from all others. This character ſerves not only for the acid in its pure ſtate, but likewiſe for all its combinations that are ſoluble in water: if a ſolution of any compound ſalt whoſe acid is the vitriolic, be added to a ſolution of chalk in any other acid, the vitriolic acid will part from the ſubſtance it was before combined with, and join itſelf to the chalk, forming therewith a compound, which, being no longer diſſoluble in the liquor, renders the whole milky for a time, and then gradually ſubſides.

106. This acid may be diſtinguiſhed alſo in compound ſalts, by another criterion not leſs ſtrongly marked: if any ſalt containing it be mixed with powdered charcoal, and the mixture expoſed, in a cloſe veſſel, to a moderately ſtrong fire, the acid will unite with the directly inflammable part of the charcoal, and compoſe therewith a genuine ſulphur. Common brimſtone is no other than a combination of the vitriolic acid with a ſmall proportion of inflammable matter. With any kind of inflammable matter that is not volatile in cloſe veſſels, as the coal of vegetables, of animals, or of bitumens, this acid compoſes always the ſame identical ſulphur.

107. The nitrous acid alſo, whatever kind of body it be combined with, is both diſtinguiſhed and extricated therefrom, by means of any inflammable ſubſtance brought to a ſtate of ignition: if the ſubject be mixed with a little powdered charcoal, and made red-hot, a deflagration or fulmination enſues, that is, a bright flame with a hiſſing noiſe; and the inflammable matter and the acid being thus conſumed or diſſipated together, there remains only the ſubſtance that was before combined with the acid, and the ſmall quantity of aſhes afforded by the coal.

108. This property of the nitrous acid, deflagrating with inflammable ſubſtances, and that of the vitriolic of forming ſulphur with them, ſerve not only as criteria of the reſpective acids in their various forms and diſguiſes, but likewiſe for diſcovering inflammable matter in bodies, when its quantity is too ſmall to be ſenſible on other trials.

109. If a fixed alkaline ſalt be united with a vegetable acid, as that of vinegar, into a neutral ſalt; on adding to this compound ſome marine acid, the acetous acid will be diſengaged, ſo as to exhale totally in a moderate heat, leaving the marine in poſſeſſion of the alkali; the addition of the nitrous will in like manner diſpoſſeſs the marine, which now ariſes in its proper white fumes, though without ſuch an addition it could not be extricated from the alkali by any degree of heat: on the addition of the vitriolic acid, the nitrous gives way in its turn, exhaling in red fumes, and leaving only the vitriolic acid and the alkali united together.

110. Again, if any metallic body be diſſolved in an acid, the addition of any earthy body that is diſſoluble in that acid will precipitate the metal: a volatile alkaline ſalt will in like manner precipitate the earth, and a fixed alkali will diſlodge the volatile; which laſt being readily exhaled by heat, the remaining ſalt will be the ſame as if the acid and fixed alkali had been joined together at firſt, without the intervention of any of the other bodies.

111. The power in bodies, on which theſe various tranſpoſitions and combinations depend, is called by the chemiſts *affinity*; a term, like the Newtonian *attraction*, deſigned to expreſs, not the cauſe, but the effect. When an acid ſpontaneouſly quits a metal to unite with an alkali, they ſay it has a greater affinity to the alkali than to the metal: and when, converſely, they ſay it has a greater affinity to fixed alkalies than to thoſe of the volatile kind, they mean only that it will unite with the fixed in preference to the volatile, and that, if previouſly united with a volatile alkali, it will forſake this for a fixed one.

112. The doctrine of the affinities of bodies is of a very extenſive uſe in the chemical pharmacy: many of the officinal proceſſes, as we ſhall ſee hereafter, are founded on it: ſeveral of the preparations turn out very different from what would be expected by a perſon unacquainted with theſe properties of bodies; and ſeveral of them, if, from an error in the proceſs, or other cauſes, they prove unfit for the uſe intended, may

be rendered applicable to other purpoſes, by ſuch tranſpoſitions of their component parts as are pointed out by the knowledge of their affinities. See Chemistry, n° 64.

CHAP. II.

Of the Pharmaceutical Apparatus.

117. *Furnaces.* One of the principal parts of the pharmaceutic apparatus conſiſts in contrivances for containing and applying fire, and for directing and regulating its power. Of theſe contrivances, called *furnaces*, there are different kinds, according to the conveniency of the place, and the particular purpoſes they are intended to anſwer. See the article Furnace; and Chemistry, n° 98, 99, 101, 102.

118. The moſt ſimple pharmaceutical furnace is the common ſtove, otherwiſe called the *furnace for open fire*. This is uſually made of an iron hoop, five or ſix inches deep; with a grate or ſome iron-bars acroſs the bottom, for ſupporting the fuel. It either ſtands upon feet, ſo as to be moveable from place to place, or is fixed in brick-work. In this laſt caſe, a cavity is left under the grate for receiving the aſhes that drop thro' it; and an aperture or door, in the fore-part of this aſh-pit, ſerves both for allowing the aſhes to be occaſionally raked out, and for admitting air to paſs up through the fuel. This furnace is deſigned for ſuch operations as require only a moderate heat; as infuſion, decoction, and the evaporation of liquids. The veſſel containing the ſubject-matter is ſupported over the fire by a trevet.

119. A deeper hoop or body, cylindrical, parallelopipedal, widening upwards, elliptical, or of other figures; formed of, or lined with, ſuch materials as are capable of ſuſtaining a ſtrong fire, with a grate and aſh-pit beneath, as in the preceding, and communicating at the top with a perpendicular pipe, or chimney, makes a wind-furnace.

120. The greater the perpendicular height of the chimney, the greater will be the draught of air thro' the furnace, and the more intenſely will the fire burn; provided the width of the chimney is ſufficient to allow a free paſſage to all the air that the furnace can receive thro' the grate: for which purpoſe, the area of the aperture of the chimney ſhould be nearly equal to the area of the interſtices of the grate.

121. Hence, where the chimney conſiſts of moveable pipes, made to fit upon one another at the ends, ſo that the length can be occaſionally increaſed or diminiſhed, the vehemence of the fire will be increaſed or diminiſhed in the ſame proportion.

122. In furnaces whoſe chimney is fixed, the ſame advantage may be procured on another principle. As the intenſity of the fire depends wholly upon the quantity of air ſucceſſively paſſing through and animating the burning fuel, it is obvious, that the moſt vehement fire may be ſuppreſſed or reſtrained at pleaſure, by more or leſs cloſing either the aſh-pit door by which the air is admitted, or the chimney by which it paſſes off; and that the fire may be more or leſs raiſed again, by more or leſs opening thoſe paſſages. A moveable plate or regiſter, in any convenient part of the chimney, affords commodious means of varying the width of the paſſage, and conſequently of regulating the heat.

123. There are two general kinds of theſe wind-furnaces; one, with the chimney on the top, over the middle of the furnace; the other with the chimney on one ſide, and the mouth clear.

124. In the firſt, either the upper part of the furnace is contracted to ſuch an aperture, that the chimney may fit upon it; or it is covered with an arched dome, or with a flat plate, having a like aperture in the middle. As in this diſpoſition of the chimney, the inſide of the furnace cannot be come at from above; a door is made in the ſide, a little above the grate, for ſupplying fuel, inſpecting the matter in the fire, &c.

125. For performing fuſions in this furnace, the crucible, or melting veſſel, is placed immediately among the fuel; with a ſlip of brick, or ſome other like ſupport, between it and the grate, to keep the cold air, which enters underneath, from ſtriking on its bottom.

126. When deſigned as a reverberatory, that is, for diſtillation in long necks or coated glaſs-retorts, two iron bars are placed acroſs, above the fire, for ſupporting the veſſel, whoſe neck comes out at an aperture made for that purpoſe in the ſide. This aperture ſhould be made in the ſide oppoſite to that in which is the door above-mentioned, or at leaſt ſo remote from it, that the receiver, fitted on the neck of the diſtilling veſſel without the furnace, may not lie in the operator's way when he wants to ſtir the fire or throw in freſh fuel.

127. The other kind of wind-furnace communicates, by an aperture in its back-part near the top, either with an upright pipe of its own, or with the chimney of the room; in which laſt caſe, all other paſſages into the chimney muſt be cloſed up. Here the mouth of the furnace ſerves for a door, which may be occaſionally covered with a plate or tile. Of this kind is the furnace moſt commonly uſed for fuſion in a crucible.

151. *Veſſels.* Of theſe and other pharmaceutical inſtruments the principal will be mentioned in the following chapter, in ſpeaking of the ſeveral operations to which they are reſpectively ſubſervient.

152. *Weights.* Two different kinds of weights are made uſe of in this country; one in the merchandize of gold and ſilver; the other for almoſt all goods beſides. The firſt we call *Troy*, the latter *Averdupois weight*.

153. The goldſmiths divide the Troy pound into 12 ounces; the ounce into 20 penny-weights; and the penny-weight into 24 grains. The Averdupois pound is divided into 16 ounces; and the ounce into 16 parts, called *drams*.

The pound of the London and Edinburgh diſpenſatories (which is the only one made uſe of in this article) is that of the goldſmiths, divided in the following manner:

The Pound	contains	twelve Ounces.
The Ounce		eight Drams.
The Dram		three Scruples.
The Scruple		twenty Grains.

The grain is equal to the goldſmiths grain.

154. The medical or Troy pound is leſs than the averdupois, but the ounce and the dram greater. The Troy pound contains 5760 grains; the averdupois 7000 grains. The Troy ounce contains 480 grains; the averdupois only $437\frac{1}{2}$. The Troy dram 60; the averdupois dram ſomewhat more than 27. Eleven drams averdupois are equal to five drams Troy; 12 ounces

averdupois to nearly 11 ounces Troy; and 19 pounds averdupois to ſomewhat more than 23 pounds Troy.

155. Theſe differences in our weights have occaſioned great confuſion in the practice of Pharmacy. As the druggiſts and grocers ſell by the averdupois weight, the apothecaries have not in general kept any weights adjuſted to the Troy pound greater than two drams, uſing for all above averdupoiſe. By this means it is apparent, that in all compoſitions, where the ingredients are preſcribed, ſome by pounds and others by ounces, they are taken in a wrong proportion to each other; and the ſame happens when any are directed in leſſer denominations than the ounce, as theſe ſubdiviſions uſed by the apothecaries are made to a different ounce. The mercurial plaſter of the late Pharmacopœia, and the mercurial cerate of the preſent, if compounded by the averdupoiſe weight, contain about one-ſixth leſs quickſilver than if made, as they ought to be, by the Troy. This error prevailed ſo far as to be received in ſome former editions of the London Pharmacopœia itſelf; but is now happily removed.

156. *Meaſures*. The meaſures employed with us in pharmacy are the common wine-meaſures.

A Gallon	contains	eight Pints (*libræ*).
The Pint		ſixteen Ounces.
The Ounce		eight Drams.

157. By a ſpoonful, in the London diſpenſatory, is underſtood, the meaſure of half an ounce; in the Edinburgh, half an ounce weight in ſyrups, and three drams in diſtilled waters.

158. Though the pint is called by Latin writers *libra* or "pound," there is not any known liquor of which a pint-meaſure anſwers to that weight. A pint of the higheſt rectified ſpirit of wine exceeds a pound by above half an ounce; a pint of water exceeds it by upwards of three ounces; and a pint of oil of vitriol weighs more than two pounds and a quarter.

159. A table of the weights of certain meaſures of different fluids may on many occaſions be uſeful, both for aſſiſting the operator in regulating their proportions in certain caſes, and for ſhewing the comparative gravities of the fluids themſelves. Dr Lewis has drawn up ſuch a table for a pint, an ounce, and a dram meaſure of thoſe liquids, whoſe gravity has been determined by experiments that can be relied on. The wine-gallon contains 231 cubic inches; whence the pint contains $28\frac{7}{8}$; the ounce $1\frac{103}{128}$; and the dram $\frac{231}{1424}$ of a cubic inch.

	Pint weighs			Ounce meaſure weighs	Dram meaſure weighs
	ounces	drams	grains	grains	grains
INFLAMMABLE SPIRITS.					
Æthereal ſpirit of wine	11	1	36	336	42
Highly-rectified ſpirit of wine	12	5	20	380	$47\frac{1}{2}$
Common-rectified ſpirit of wine	13	2	40	400	50
Proof-ſpirit - -	14	1	36	426	53
Dulcified ſpirit of ſalt -	14	4	48	438	55
Dulcified ſpirit of nitre -	15	2	40	460	$57\frac{1}{2}$
WINES.					
Burgundy - -	14	1	36	426	53
Red port - -	15	1	36	456	57
Canary - - -	15	6	40	475	$59\frac{1}{2}$
EXPRESSED OILS.					
Oil-olive - -	14	0	0	420	$52\frac{1}{2}$
Linſeed-oil - -	14	2	8	428	$53\frac{1}{2}$
ESSENTIAL OILS.					
Oil of turpentine -	12	1	4	364	$45\frac{1}{2}$
of orange-peel -				408	51
of juniper-berries -				419	52
of roſemary -				430	54
of origanum -				432	54
of caraway-ſeeds -				432	54
of nutmegs -				436	$54\frac{1}{2}$
of ſavin -				443	$55\frac{1}{2}$
of hyſſop -				443	$55\frac{1}{2}$
of cummin-ſeed -				448	56
of mint - -				448	56
of pennyroyal -				450	$56\frac{1}{4}$
of dill-ſeed -				457	57
of fennel-ſeed -				458	57
of cloves - -				476	$59\frac{1}{2}$
of cinnamon -				476	$59\frac{1}{2}$
of ſaſſafras -				503	63
ALKALINE LIQUORS.					
Lixiv. ſaponarium, *Phar. Lond.*	16	0	0	480	60
Spirit of ſal ammoniac -	17	1	10	515	$64\frac{1}{2}$
Strong ſoap-boilers ley	17	6	24	534	67
Lixivium tartari -	24	0	0	720	90
ACID LIQUORS.					
Wine-vinegar - -	15	3	44	464	58
Beer-vinegar - -	15	6	56	476	$59\frac{1}{2}$
Glauber's ſpirit of ſalt	17	4	0	525	$65\frac{1}{2}$
Glauber's ſpirit of nitre	20	2	40	610	76
Strong oil of vitriol -	28	5	20	860	$107\frac{1}{2}$
ANIMAL-FLUIDS.					
Urine - - -	15	5	20	470	59
Cows milk - -	15	6	40	475	$59\frac{1}{2}$
Aſſes milk - -	16	0	0	480	60
Blood - -	16	1	4	484	$60\frac{1}{2}$
WATERS.					
Diſtilled water -	15	1	50	456	57
Rain-water - -	15	2	40	460	$57\frac{1}{2}$
Spring-water - -	15	3	12	462	58
Sea-water - -	15	5	20	470	59
QUICKSILVER.	214	5	20	6440	805

CHAP. III.

Of the Pharmaceutical OPERATIONS.

SECT. I. *Solution.*

160. SOLUTION is an intimate commixture of ſolid bodies with fluids into one ſeemingly homogene liquor. The diſſolving fluid is called a *Menſtruum* or *Solvent*.

161. The principal menſtrua made uſe of in pharmacy, are water, vinous ſpirits, oils, acid and alkaline liquors.

162. Water is the menſtruum of all ſalts, of vegetable gums, and of animal-gellies. Of ſalts it diſſolves only a determinate quantity, though of one kind of ſalt more than another; and being thus ſaturated, leaves any additional quantity of the ſame ſalt untouched.

163. Experiments have been made for determining

the quantities of water which different ſalts require for their diſſolution: Mr Eller has given a large ſet in the Memoirs of the royal academy of ſciences of Berlin for the year 1750, from which the following table is extracted.

Eight ounces by weight of diſtilled water diſſolved

	oz.	dr.	gr.
Of refined ſugar	24	0	0
Green vitriol	9	4	0
Blue vitriol	9	0	0
White vitriol	4	4	0
Epſom ſalt	4	0	0
Purified nitre	4	0	0
Soluble tartar	4	0	0
Common ſalt	3	4	0
Sal gemmæ	3	4	0
Sal catharticus Glauberi	3	4	0
Seignette's ſalt	3	0	0
Alum	2	4	0
Sal ammoniac	2	4	0
Vitriolated tartar	1	4	0
Salt of hartſhorn	1	4	0
Sugar of lead	1	2	0
Cream of tartar	1	0	0
Borax	0	4	20

164. Though great care appears to have been taken in making theſe experiments, it is not to be expected, that the proportions of the ſeveral ſalts, ſoluble in a certain quantity of water, will always be found exactly the ſame with thoſe above ſet down. Salts differ in their ſolubility according to the degree of their purity, perfection, and drineſs: the vitriols, and the artificial compound ſalts in general, differ remarkably in this reſpect, according as they are more or leſs impregnated with the acid ingredient. Thus vitriolated tartar, perfectly neutralized, is extremely difficult of ſolution: the matter which remains in making Glauber's ſpirit of nitre, is no other than a vitriolated tartar; and it diſſolves ſo difficultly, that the operator is obliged to break the retort in order to get it out; but on adding more of the vitriolic acid, it diſſolves with eaſe. Hence many have been tempted to uſe an overproportion of acid in this preparation; and we frequently find in the ſhops, under the name of *vitriolated tartar*, this acid ſoluble ſalt. The degree of heat occaſions alſo a notable difference in the quantity of ſalt taken up: in very cold weather, eight ounces of water will diſſolve only about one ounce of nitre; whereas, in warm weather, the ſame quantity will take up three ounces or more. To theſe circumſtances are probably owing, in great part, the remarkable differences in the proportional ſolubilities of ſalt, as determined by different authors: it is obſervable, that common ſalt is leſs affected in its ſolubility, by a variation of heat, than any other, water in a temperate ſtate diſſolving nearly as much of it as very hot water; and accordingly this is the ſalt in which the different experiments agree the beſt. In the experiments of Hoffmann, Neumann, and Petit, the proportion of this ſalt, on a reduction of the numbers, comes out exactly the ſame, viz. three ounces of the ſalt to eight of water: Dr Browurigg makes the quantity of ſalt a little more; Dr Grew, a dram and a ſcruple more; and Eller, as appears in the above table, four drams more: ſo that in the trial of ſix different perſons, made probably in different circumſtances, the greateſt difference is only one-ſixth of the whole quantity of ſalt; whereas in ſome other ſalts there are differences of twice or thrice the quantity of the ſalt. In the experiments from which the table is drawn, the water was of the temperature of between 40 and 42 degrees of Fahrenheit's thermometer, or above freezing by about one ſeventh of the interval between freezing and the human heat.

165. Some ſalts omitted by Eller are here ſubjoined: the firſt is taken from Dr Grew, and the other four from Neumann.

Eight ounces of water diſſolved

		oz.	dr.	gr.
Of fixed alkaline ſalt	above	8	0	0
Sal diureticus		8	0	0
Sugar-candy, both brown and white		9	0	0
Sugar of milk		0	2	40
Eſſential ſalt of ſorrel		0	1	20

166. Though water takes up only a certain quantity of one kind of ſalt, yet when ſaturated with one, it will ſtill diſſolve ſome portion of another; and when it can bear no more of either of theſe, it will ſtill take up a third, without letting go any of the former. The principal experiments of this kind that have been made relative to pharmaceutic ſubjects, are exhibited in the following table, of which the two firſt articles are from Grew, and the others from Eller.

Water, 32 parts by weight

fully ſaturated with	diſſolved afterwards			
Nitre	Sal ammoniac	10		
Common ſalt	Nitre	10	Sal amm.	2
Nitre	Fixed alkali	7	Com. ſalt	2
Common ſalt	Nitre, near	2	Fixt alk.	2½
Volatile alkali	Nitre	4	Sugar	2
Sal ammoniac	Common ſalt	2½		
Soluble tartar	Nitre	2		
Vitriolated tartar	Fixed alkali	2		
Glauber's ſalt	Nitre	1	Sugar	1
Epſom ſalt	Sugar	6		
Borax	Fixed alkali	2		

167. In regard to the other claſs of bodies which water is a menſtruum for, viz. thoſe of the gummy and gelatinous kind, there is no determinate point of ſaturation: the water unites readily with any proportions of them, forming with different quantities liquors of different conſiſtences. This fluid takes up likewiſe, when aſſiſted by trituration, the vegetable gummy reſins, as ammoniacum and myrrh; the ſolutions of which, though imperfect, that is, not tranſparent, but turbid and of a milky hue, are nevertheleſs applicable to valuable purpoſes in medicine. It mingles with vinous ſpirits, with acid and alkaline liquors, not with oils; but imbibes ſome of the more ſubtle parts of eſſential oils, ſo as to become impregnated with their ſmell and taſte.

168. Rectified ſpirit of wine is the menſtruum of the eſſential oils, reſins and camphor of vegetables; of the pure diſtilled oils, and ſeveral of the colouring and medicinal parts of animals; of ſome mineral bi-

tuminous ſubſtances, as of ambergris: and of ſoaps, though it does not act upon the expreſſed oil and fixed alkaline ſalt of which ſoap is compoſed; whence, if ſoap contains any ſuperfluous quantity of either the oil or ſalt, it may, by means of this menſtruum, be excellently purified therefrom. It diſſolves, by the aſſiſtance of heat, volatile alkaline ſalts; and, more readily, the neutral ones, compoſed either of fixed alkali and the acetous acid, as the ſal diureticus, or of volatile alkali and the nitrous acid, as alſo the ſalt of amber, &c. It mingles with water and with acids; not with alkaline lixivia.

169. Oils diſſolve vegetable reſins and balſams, wax, animal-fat, mineral bitumens, ſulphur, and certain metallic ſubſtances, particularly lead. The expreſſed oils are, for moſt of theſe bodies, more powerful menſtrua than thoſe obtained by diſtillation; as the former are more capable of ſuſtaining, without injury, a ſtrong heat, which is, in moſt caſes, neceſſary to enable them to act. It is ſaid, that one ounce of ſulphur will diſſolve in three ounces of expreſſed oil, particularly that of linſeed; but requires ſix ounces of eſſential oil, as that of turpentine.

170. All acids diſſolve alkaline ſalts, alkaline earths, and metallic ſubſtances. The different acids differ greatly in the action upon theſe laſt; one diſſolving only ſome particular metals; and another, others.

171. The vegetable acids diſſolve a conſiderable quantity of zinc, iron, copper, lead, and tin; and extract ſo much from the metallic part of antimony, as to become powerfully emetic: they diſſolve lead more readily, if the metal is previouſly calcined by fire, than in its metallic ſtate.

172. The marine acid diſſolves zinc, iron, and copper; and though it ſcarce acts on any other metallic ſubſtance in the common way of making ſolutions, it may nevertheleſs be artfully combined with them all except gold: the corroſive ſublimate, and antimonial cauſtic of the ſhops, are combinations of it with mercury and the metallic part of antimony, effected by applying the acid, in the form of fume, to the ſubjects, at the ſame time alſo ſtrongly heated.

173. The nitrous acid is the common menſtruum of all metallic ſubſtances, except gold and the metallic part of antimony; of which two, the proper ſolvent is a mixture of the nitrous and marine acids called *aqua regia*.

174. The vitriolic acid, diluted with water, eaſily diſſolves zinc and iron: in its concentrated ſtate, and aſſiſted by a boiling heat, it may be made to corrode, or imperfectly diſſolve, moſt of the other metals.

175. Alkaline lixivia diſſolve oils, reſinous ſubſtances, and ſulphur. Their power is greatly promoted by the addition of quicklime; inſtances of which occur in the preparation of ſoap, and in the common cauſtic. Thus acuated, they reduce the fleſh, bones, and other ſolid parts of animals, into a gelatinous matter.

176. Solutions made in water, and in ſpirit of wine, poſſeſs the virtues of the body diſſolved; whilſt oils generally ſheathe its activity, and acids and alkalies vary its quality. Hence watery and ſpirituous liquors are the proper menſtrua of the native virtues of vegetable and animal matters.

177. Moſt of the foregoing ſolutions are eaſily effected, by pouring the menſtruum on the body to be diſſolved, and ſuffering them to ſtand together, for ſome time, expoſed to a ſuitable warmth. A ſtrong heat is generally requiſite to enable oils and alkaline liquors to perform their office: nor will acids act on ſome metallic bodies without its aſſiſtance. The action of watery and ſpirituous menſtrua is likewiſe expedited by a moderate heat; though the quantity which they afterwards keep diſſolved is not, as ſome ſuppoſe, by this means increaſed: all that heat occaſions theſe to take up more than they would do in a longer time in the cold, will, when the heat ceaſes, ſubſide again: this at leaſt is moſt commonly the caſe, though there may be ſome inſtances of the contrary.

178. The action of acids on the bodies which they diſſolve, is generally accompanied with heat, efferveſcence, and a copious diſcharge of fumes. The fumes which ariſe during the diſſolution of ſome metals in the vitriolic acid, prove inflammable: hence in the preparation of the artificial vitriols of iron and zinc, the operator ought to be careful, eſpecially where the ſolution is made in a narrow-mouthed veſſel, leſt, by the imprudent approach of a candle, the exhaling vapour be ſet on fire.

179. There is another ſpecies of ſolution, in which the moiſture of the air is the menſtruum. Fixed alkaline ſalts, and thoſe of the neutral kind, compoſed of alkaline ſalts and the vegetable acids, or of ſoluble earths and any acid except the vitriolic, and ſome metallic ſalts, on being expoſed for ſome time to a moiſt air, gradually attract its humidity, and at length become liquid. Some ſubſtances, not diſſoluble by the application of water in its groſſer form, as the butter of antimony, are eaſily liquefied by this ſlow action of the aërial moiſture. This proceſs is termed *Deliquiation*.

SECT. II. *Extraction*.

180. THE liquors which diſſolve certain ſubſtances in their pure ſtate, ſerve likewiſe to extract them from admixtures of other matter. Thus rectified ſpirit of wine, the menſtruum of eſſential oils and reſins, takes up the virtues of the reſinous and oily vegetables; as water does thoſe of the mucilaginous and ſaline; the inactive earthy parts remaining untouched by both. Water extracts likewiſe from many plants ſubſtances which by themſelves it has little effect upon; even eſſential oils being, as we have formerly obſerved, rendered ſoluble in that fluid, by the admixture of gummy and ſaline matter, of which all vegetables participate in a greater or leſs degree. Thus many of the aromatic plants, and moſt of the bitters and aſtringents, yield their virtues to this menſtruum.

181. Extraction is performed by *macerating* or ſteeping the ſubject in its appropriated menſtruum in the cold, or *digeſting* or *circulating* them in a moderate warmth; or *infuſing* the plant in the boiling liquor, and ſuffering them to ſtand in a covered veſſel till grown cold; or actually *boiling* them together for ſome time.

182. The term *digeſtion* is ſometimes uſed for maceration; and in this caſe the proceſs is directed to be performed without heat: where this circumſtance is not expreſſed, digeſtion always implies the uſe of heat. Circulation differs from digeſtion only in this, that the ſteam, into which a part of the liquor is reſolved by the heat, is, by means of a proper diſpoſition of the

veſſels, condenſed and conveyed back again upon the ſubject. Digeſtion is uſually performed in a *matraſs*, (or *bolthead*), Florence flaſk, or the like; either of which may be converted into a circulatory veſſel, by inverting another into the mouth, and ſecuring the juncture with a piece of wet bladder. A ſingle matraſs, if its neck is very long and narrow, will anſwer the purpoſe as effectually, the vapour cooling and condenſing before it can riſe to the top. In a veſſel of this kind, even ſpirit of wine, one of the moſt volatile liquors we know of, may be boiled without any conſiderable loſs. The uſe of this inſtrument is likewiſe free from an inconvenience which may, in ſome caſes, attend the other, of the uppermoſt veſſel being burſt or thrown off. As the long-necked matraſſes here recommended are difficultly filled or emptied, and likewiſe very dear, a long glaſs-pipe may be occaſionally luted to the ſhorter ones.

183. Heat greatly expedites extraction; but by this means proves as injurious to ſome ſubſtances, by occaſioning the menſtruum to take up their groſſer and more ungrateful parts, as it is neceſſary for enabling it to extract the virtues of others. Thus guaiacum or logwood impart little to aqueous liquors without a boiling heat, whilſt even a ſmall degree of warmth proves greatly prejudicial to the fine bitter of carduus benedictus. This plant, which, infuſed in boiling, or digeſted in ſenſibly hot water, gives out a nauſeous taſte, ſo offenſive to the ſtomach as to promote vomiting, yields to the cold element a grateful balſamic bitter, the moſt elegant ſtomachic of the ſhops.

184. As heat promotes the diſſolving power of liquids; ſo cold, on the other hand, diminiſhes it. Hence tinctures, or extractions made by a conſiderable heat, depoſit in cold weather a part of their contents, and thus become proportionably weaker; a circumſtance which deſerves particular regard.

SECT. III. *Depuration.*

185. There are different methods of depurating or purifying liquors from their feculences, according as the liquor itſelf is more or leſs tenacious, or the feculent matter of greater or leſs gravity.

186. Thin fluids readily depoſit their more ponderous impurities upon ſtanding at reſt for ſome time in a cool place: and may then be *decanted*, or poured off clear, by inclining the veſſel.

187. Glutinous, unctuous, or thick ſubſtances, are to be liquefied by a ſuitable heat; when the groſſer feculencies will fall to the bottom, the lighter aring to the ſurface, to be *deſpumated* or ſcummed off.

188, 189. Where the impurities are neither ſo pondeous as to ſubſide freely to the bottom, nor ſo light as to ariſe readily to the ſurface, they may be ſeparated in great meaſure by *colature* through ſtrainers of linen, woollen, or other cloth, and more perfectly by *filtration* through a ſoft bibulous kind of paper made for this uſe.

190. Glutinous and unctuous liquors, which do not eaſily paſs through the pores of a filter or ſtrainer, are *clarified* by beating them up with whites of eggs; which concreting or growing hard when heated, and entangling the impure matter, ariſe with it to the ſurface. The mixture is to be gently boiled till the ſcum begins to break, when the veſſel is to be removed from the fire, the cruſt taken off, and the liquor paſſed through a flannel-bag.

191. Decantation, colature, and filtration, are applicable to moſt of the medicated liquors that ſtand in need of purification. Deſpumation and clarification very rarely have place; ſince theſe, along with the impurities of the liquor, frequently ſeparate its medicinal parts. Thus, if the decoction of poppy-heads for making diacodium be ſolicitouſly ſcummed or clarified, (as ſome have been accuſtomed to do), the medicine will loſe almoſt all that the poppies communicated; and inſtead of a mild opiate, turn out little other than a plain ſyrup of ſugar.

192. It may be proper to obſerve, that the common ſorts of filtering-paper are apt to communicate a diſagreeable flavour: and hence, in filtering fine bitters, or other liquors whoſe gratefulneſs is of primary conſequence, the part which paſſes through firſt ought to be kept apart for inferior purpoſes.

SECT. IV. *Cryſtallization.*

193,—197. Water, aſſiſted by heat, diſſolves a larger proportion of ſaline ſubſtances than it can retain when grown cold. Hence, on the abatement of the heat, a part of the ſalt ſeparates from the menſtruum, and concretes at the ſides and bottom of the veſſel. Theſe concretions, unleſs too haſtily formed by the ſudden cooling of the liquor, or diſturbed in their coaleſcence by agitation or other like cauſes, prove tranſparent, and of regular figures, reſembling in appearance the natural ſprig-cryſtals.

198. Different ſalts require different quantities of water to keep them diſſolved: and hence if a mixture of two or more be diſſolved in this fluid, they will begin to ſeparate and cryſtallize at different periods of the evaporation. Upon this foundation ſalts are freed not only from ſuch impurities as water is not capable of diſſolving and carrying through the pores of a filter, but likewiſe from admixtures of one another; that which requires moſt water to diſſolve in ſhooting firſt into cryſtals.

SECT. V. *Precipitation.*

199. By this operation, bodies are recovered from their ſolutions by means of the addition of ſome other ſubſtance, with which either the menſtruum, or the body diſſolved, have a greater affinity than they have with one another.

200, 201. Precipitation, therefore, is of two kinds; one where the ſubſtance ſuperadded unites with the menſtruum, and occaſions that before diſſolved to be thrown down; the other, in which it unites with the diſſolved body, and falls along with it to the bottom. Of the firſt we have an example in the precipitation of ſulphur from alkaline lixivia by the means of the acid; of the ſecond, in the precipitation of mercury from aquafortis by ſea-ſalt or its acid.

189. Where metals are employed as precipitants, as in the purification of martial vitriol from copper, by the addition of freſh iron, they ought to be perfectly clean and free from any ruſty or greaſy matter: otherwiſe they will not readily, if at all, diſſolve, and conſequently the precipitation will not ſucceed; for the ſubſtance to be precipitated ſeparates only by the additional one diſſolving and taking its place. The

ſeparated powder oftentimes, inſtead of falling to the bottom, lodges upon the precipitant; from which it muſt be occaſionally ſhaken off, for reaſons ſufficiently obvious.

203. Though in this operation the precipitated powder is generally the part required for uſe, yet ſome advantage may frequently be made of the liquor remaining after the precipitation. Thus when fixed alkaline ſalt is diſſolved in water, and ſulphur diſſolved in this lixivium, the addition of acids ſeparates and throws down the ſulphur, only in virtue of the acid uniting with and neutralizing the alkali by which the ſulphur was held diſſolved; conſequently, if the precipitation is made with the vitriolic acid, and the acid gradually dropped in till the alkali is completely ſatiated, that is, ſo long as it continues to occaſion any precipitation or turbidneſs, the liquor will yield, by proper evaporation and cryſtallization, a neutral ſalt, compoſed of the vitriolic acid and fixed alkali, that is, vitriolated tartar. In like manner, if the precipitation is made with the nitrous acid, a true nitre may be recovered from the liquor; if with the marine, the ſalt called *ſpiritus ſalis marini coagulatus*; and if with the acid of vinegar, the *ſal diureticus*.

SECT. VI. *Evaporation.*

204. This is a third method of recovering ſolid bodies from their ſolutions, effected by the means of heat; which evaporating the fluid part, that is, forcing it off in ſteam, the matter which was diſſolved therein is left behind in its ſolid form.

205. This proceſs is applicable to the ſolutions of all thoſe ſubſtances which are leſs volatile than the menſtruum, or which will not exhale by the heat requiſite for the evaporation of the fluid; as the ſolutions of fixed alkaline ſalts, of the gummy, gelatinous, and other inodorous parts of vegetables and animals in water, and of many reſinous and odorous ſubſtances in ſpirit of wine.

206. Water extracts the virtues of ſundry fragrant aromatic herbs almoſt as perfectly as rectified ſpirit of wine: but the aqueous infuſions are far from being equally ſuited to this proceſs with thoſe made in ſpirit; water carrying off the whole odour and flavour of the ſubject, which that lighter liquor leaves entire behind it. Thus a watery infuſion of mint loſes in evaporation the ſmell, taſte, and virtues of the herb; whilſt a tincture drawn with pure ſpirit yields, on the ſame treatment, a thick balſamic liquid, or ſolid gummy reſin, extremely rich in the peculiar qualities of the mint.

207. In evaporating theſe kinds of liquors, particular care muſt be had, towards the end of the proceſs, that the heat be very gentle; otherwiſe the matter as it grows thick will burn to the veſſel, and contract a diſagreeable ſmell and taſte: this burnt flavour is called an *empyreuma*. The liquor ought to be kept ſtirring during the evaporation; otherwiſe a part of the matter concretes on the ſurface expoſed to the air, and forms a pellicle which impedes the farther evaporation.

SECT. VII. *Diſtillation.*

208. In the foregoing operation, fluids are rarefied by heat into ſteam or vapour, which is ſuffered to exhale in the air, but which the buſineſs of this is to collect and preſerve. For this purpoſe the ſteam is received in proper veſſels, luted to that in which the ſubject is contained; and being there cooled, condenſes into a fluid form again.

209. There are two kinds of diſtillation: by the one, the more ſubtle and volatile parts of liquors are elevated from the groſſer; by the other, liquids, incorporated with ſolid bodies, are forced out from them by vehemence of fire.

210. To the firſt belongs the diſtillation of the pure inflammable ſpirit from vinous liquors, and of ſuch of the active parts of vegetables as are capable of being extracted by boiling water or ſpirit, and at the ſame time of ariſing along with their ſteam.

211. As boiling water extracts or diſſolves the eſſential oils of vegetables whilſt blended with the other principles of the ſubject without ſaturation, but imbibes only a determinate, and that a ſmall, portion of them in their pure ſtate; as theſe oils are the only ſubſtances contained in common vegetables, which prove totally volatile in that degree of heat; and as it is in them that the virtues of aromatics, and the peculiar odour and flavour of all plants, reſide; it is evident that water may be impregnated, by diſtillation, with the more valuable parts of many vegetables: that this impregnation is limited, the oil ariſing in this proceſs pure from thoſe parts of the plant which before rendered it ſoluble in water without limitation; hence greateſt part of the oil ſeparates from the diſtilled aqueous liquor, and, according to its greater or leſs gravity, either ſinks to the bottom or ſwims on the ſurface: that conſequently infuſions and diſtilled waters are greatly different from one another: that the firſt may be rendered ſtronger and ſtronger by pouring the liquor on freſh parcels of the ſubject; but that the latter cannot be in like manner improved by *cohobating*, or rediſtilling them from freſh ingredients.

212. As the oils of many vegetables do not freely diſtil with a leſs heat than that in which water boils, as rectified ſpirit of wine is not ſuſceptible of this degree of heat, and as this menſtruum totally diſſolves theſe oils in their pure ſtate; it follows, that ſpirit elevates far leſs from moſt vegetables than water; but that nevertheleſs the diſtilled ſpirit, by keeping all that it does elevate perfectly diſſolved, may, in ſome caſes, prove as ſtrong of the ſubject as the diſtilled water.

213. The apparatus made uſe of for diſtilling ſpirits, waters, and oils, conſiſts of a *ſtill*, or copper veſſel, for containing the ſubject, on which is luted a large *head* with a *ſwan neck*. The vapour ariſing into the head, is thence conveyed through a *worm*, or long ſpiral pipe, placed in a veſſel of cold water called a *refrigeratory*; and being there condenſed, runs down into a *receiver*.

214. It may be obſerved, that as the parts which are preſerved in evaporation cannot ariſe in diſtillation, the liquor remaining after the diſtillation, properly depurated and inſpiſſated, will yield the ſame extracts as thoſe prepared from the tincture or decoction of the ſubject made on purpoſe for that uſe; the one of theſe operations collecting only the volatile parts, and

the other the more fixed; ſo that where one ſubject contains medicinal parts of both kinds, they may thus be obtained diſtinct, without one being injured by the proceſs which collects the other.

215, 216, 217. The ſubjects of the ſecond kind of diſtillation are, the groſs oils of vegetables and animals, the mineral acid ſpirits, and the metallic fluid quickſilver; which as they require a much ſtronger degree of heat to elevate them than the foregoing liquors can ſuſtain, ſo they likewiſe condenſe without ariſing ſo far from the action of the fire. The diſtillation of theſe is performed in low glaſs-veſſels, called, from their neck being bent to one ſide, *retorts:* to the farther end of the neck a *receiver* is luted, which ſtanding without the furnace, the vapours ſoon condenſe in it, without the uſe of a refrigeratory: nevertheleſs, to promote this effect, ſome are accuſtomed, eſpecially in warm weather, to cool the receiver, by occaſionally applying wet cloths to it, or keeping it partly immerſed in a veſſel of cold water.

Sect. VIII. *Sublimation.*

218. As all fluids are volatile by heat, and conſequently capable of being ſeparated, in moſt caſes, from fixed matters by the foregoing proceſs; ſo various ſolid bodies are ſubjected to a ſimilar treatment. Fluids are ſaid to *diſtil,* and ſolids to *ſublime;* though ſometimes both are obtained in one and the ſame operation. If the ſubliming matter concretes into a maſs, it is commonly called a *ſublimate;* if into a powdery form, *flowers.*

219. The principal ſubjects of this operation are, volatile alkaline ſalts; neutral ſalts, compoſed of volatile alkalies and acids, as ſal ammoniac; the ſalt of amber, and flowers of benzoin; mercurial preparations; and ſulphur. Bodies of themſelves not volatile are frequently made to ſublime by the mixture of volatile ones: thus iron is carried up by ſal ammoniac in the preparation of the *flores martiales.*

220. The fumes of ſolid bodies in cloſe veſſels riſe but little way, and adhere to that part of the veſſel where they concrete. Hence a receiver or condenſer is leſs neceſſary here than in the preceding operation; a ſingle veſſel, as a matraſs, or tall vial, or the like, being frequently ſufficient. The moſt commodious apparatus for the ſublimation of particular ſubſtances, and the moſt advantageous method of conducting the ſeveral proceſſes, will be afterwards delivered.

Sect. IX. *Expreſſion.*

221. The *preſs* is chiefly made uſe of for forcing out the juices of ſucculent herbs and fruits, and the inſipid oils of the unctuous ſeeds and kernels.

222. The harder fruits, as quinces, require to be previouſly well beat or ground; but herbs are to be only moderately bruiſed. The ſubject is then included in a hair-bag, and preſſed betwixt wooden plates, in the common ſcrew-preſs, as long as any juice runs from it.

223. The expreſſion of oils is performed nearly in the ſame manner as that of juices; only here, iron plates are ſubſtituted to the wooden ones there made uſe of. The ſubject is well pounded, and included in a ſtrong canvas-bag, betwixt which and the plates of the preſs a hair-cloth is interpoſed.

224. The inſipid oils of all the unctuous ſeeds are obtained, uninjured, by this operation, if performed without the uſe of heat, which though it greatly promotes the extraction of the oil, at the ſame time impreſſes an ungrateful flavour, and increaſes its diſpoſition to grow rancid.

225. The oils expreſſed from aromatic ſubſtances generally carry with them a portion of their eſſential oil: hence the ſmell and flavour of the expreſſed oils of nutmegs and mace. They are very rarely found impregnated with any of the other qualities of the ſubject: oil of muſtard-ſeed, for inſtance, is as ſoft and void of acrimony as that of almonds, the pungency of the muſtard remaining entire in the cake left after the expreſſion.

Sect. X. *Exſiccation.*

226. There are two general methods of *exſiccating* or drying moiſt bodies: in one, their humid parts are exhaled by heat; in the other, they are imbibed or abſorbed by ſubſtances whoſe ſoft and ſpongy texture adapts them to that uſe. Bodies intimately combined with or diſſolved in a fluid, as recent vegetables and their juices, require the firſt; ſuch as are only ſuperficially mixed, as when earthy or indiſſoluble powders are ground with water, are commodiouſly ſeparated from it by the ſecond.

227. Vegetables and their parts are uſually exſiccated by the natural warmth of the air; the aſſiſtance of a gentle artificial heat may, nevertheleſs, in general, be not only ſafely, but advantageouſly had recourſe to. By a moderate fire, even the more tender flowers may be dried in a little time, without any loſs either of their odour or lively colour; which would both be greatly injured or deſtroyed by a more ſlow exſiccation in the air. Some plants indeed, particularly thoſe of the acrid kind, as horſe-radiſh, ſcurvy-graſs, and arum, loſe their virtues by this proceſs, however carefully performed; but far the greater number retain them unimpaired, and oftentimes improved.

228. The thicker vegetable juices may be exſiccated by the heat of the ſun; or, where this is not ſufficient, by that of a water-bath, or an oven moderately warm. The thinner juices may be gently boiled till they begin to thicken, and then treated as the foregoing: this proceſs, termed *inſpiſſation* or *evaporation,* has been ſpoken of already. The juices of ſome plants, as arum-root, briony-root, orris root, wild cucumbers, &c. ſeparate, upon ſtanding for ſome time, into a thick part which falls to the bottom, and a thin aqueous one which ſwims above it: this laſt is to be poured off, and the firſt exſiccated by a gentle warmth: preparations of this kind have been uſually called *fæculæ;* that of the wild cucumber, is the only one which practice now retains.

229. Indiſſoluble bodies mixed with water into a thick conſiſtence, may be eaſily freed from the greateſt part of it, by dropping them on a chalk-ſtone, or ſome powdered chalk preſſed into a ſmooth maſs, which readily imbibes their humidity. Where the quantity of fluid is large, as in the edulcoration of precipitates, it may be ſeparated by decantation or filtration.

Sect. XI. *Comminution.*

230. Comminution is the bare reduction of ſolid

coherent bodies into ſmall particles or powder. The methods of effecting this are various, according to the texture of the ſubject.

231. Dry friable bodies, or ſuch as are brittle and not very hard, and mixtures of theſe with ſomewhat moiſt ones, are eaſily *pulverized* in a mortar.

232. For very light dry ſubſtances, reſins, and the roots of a tenacious texture, the mortar may in ſome caſes be previouſly rubbed with a little ſweet oil, or a few drops of oil be occaſionally added: this prevents the finer powder of the firſt from flying off, and the others from cohering under the peſtle. Camphor is moſt commodiouſly powdered, by rubbing it with a little rectified ſpirit of wine.

233. Tough ſubſtances, as woods, the peels of oranges and lemons, &c. are moſt conveniently *raſped;* and ſoft oily bodies, as nutmegs, paſſed through a *grater*.

234. The comminution of the harder minerals, as calamine, cryſtal, flint, &c. is greatly facilitated by *extinction;* that is, by heating them red hot, and quenching them in water: by repeating this proceſs a few times, moſt of the hard ſtones becomes eaſily pulverable. This proceſs, however, is not to be applied to any of the alkaline or calcareous ſtones; leſt, inſtead of an inſipid powder, we produce an acrimonious calx or lime.

235. Some metals, as tin, though ſtrongly cohering in their natural ſtate, prove extremely brittle when heated, inſomuch as to be eaſily divided into ſmall particles by dextrous agitation. Hence the officinal method of pulveriſing tin, by melting it, and, at the inſtant of its beginning to return into a ſtate of ſolidity, briſkly ſhaking it in a wooden box. The comminution of metals in this manner is termed by the metallurgiſts *granulation*.

236. On a ſimilar principle, certain ſalts, as nitre, may be reduced into powder in large quantity, by diſſolving them in boiling water, ſetting the ſolution over a moderate fire, and keeping the ſalt conſtantly ſtirring during its exſiccation, ſo as to prevent its particles, diſjoined by the fluid, from re-uniting together into larger maſſes.

237. Powders are reduced to a great degree of fineneſs by *triturating* or rubbing them for a length of time in a mortar. Such as are not diſſoluble in water, or injured by the admixture of that fluid, are moiſtened with it into the conſiſtence of a paſte, and *levigated* or ground on a flat ſmooth marble or iron plate; or where a large quantity is to be prepared at times, in mills made for that uſe.

238. Comminution, though one of the moſt ſimple operations of pharmacy, has, in many caſes, very conſiderable effects. The reſinous purgatives, when finely triturated, are more eaſily ſoluble in the animal-fluids, and conſequently prove more cathartic and leſs irritating than in their groſſer ſtate. Crude antimony, which when reduced to a tolerably fine powder diſcovers little medicinal virtue, if levigated to a great degree of ſubtlety, proves a powerful alterative in many chronical diſorders.

239. By comminution, the heavieſt bodies may be made to float in the lighteſt fluids, for a longer or ſhorter time, according to their greater or leſs degree of tenuity. Hence we are furniſhed with an excellent criterion of the fineneſs of certain powders, and a method of ſeparating the more ſubtle parts from the groſſer, diſtinguiſhed by the name of *elutriation*, or *waſhing over*. See 275, &c.

Sect. XII. *Fuſion.*

240. Fusion is the reduction of ſolid bodies into a ſtate of fluidity by fire. Almoſt all natural ſubſtances, the pure earths and the ſolid parts of animals and vegetables excepted, melt in proper degrees of fire; ſome in a very gentle heat, whilſt others require its utmoſt violence.

241. Turpentine, and other ſoft reſinous ſubſtances, liqueſy in a gentle warmth; wax, pitch, ſulphur, and the mineral bitumens, require a heat too great for the hand to ſupport; fixed alkaline ſalts, common ſalt, and nitre, require a red or almoſt white heat to melt them; and glaſs, a full white heat.

242. Among metallic ſubſtances, tin, biſmuth, and lead, flow long before ignition: antimony likewiſe melts before it is viſibly red-hot, but not before the veſſel is conſiderably ſo: the regulus of antimony demands a much ſtronger fire. Zinc begins to melt in a red heat; gold and ſilver require a low white heat; copper, a bright white heat; and iron, an extreme white heat.

243. One body, rendered fluid by heat, becomes ſometimes a menſtruum for another not fuſible of itſelf in the ſame degree of fire. Thus red-hot ſilver melts on being thrown into melted lead leſs hot than itſelf: and thus if ſteel, heated to whiteneſs, be taken out of the furnace, and applied to a roll of ſulphur; the ſulphur inſtantly liquefying, occaſions the ſteel to melt with it; hence the *chalybs cum ſulphure* of the ſhops. This concrete, nevertheleſs, remarkably impedes the fuſion of ſome other metals, as lead, which, when united with a certain quantity of ſulphur, is ſcarce to be perfectly melted by a very ſtrong fire: hence the method, deſcribed in its place, of purifying zinc, a metal which ſulphur has no effect upon, from the lead ſo frequently mixed with it.

244. Sulphur is the only unmetallic ſubſtance which mingles in fuſion with metals. Earthy, ſaline, and other like matters, even the calces and glaſſes prepared from metals themſelves, float diſtinct upon the ſurface, and form what is called *ſcoria* or droſs. Where the quantity of this is large in proportion to the metal, it is moſt commodiouſly ſeparated by pouring the whole into a conical mould: the pure metal or *regulus*, tho' ſmall in quantity, occupies a conſiderable height in the lower narrow part of the cone, and when congealed may be eaſily freed from the ſcoriæ by a hammer. The mould ſhould be previouſly greaſed, or rather ſmoked, to make the metal come freely out; and thoroughly dried and heated, to prevent the exploſion which ſometimes happens from the ſudden contact of melted metals with moiſt bodies.

Sect. XIII. *Calcination.*

245. By calcination is underſtood the reduction of ſolid bodies by the means of fire, from a coherent to a powdery ſtate, accompanied with a change of their quality; in which laſt reſpect this proceſs differs from comminution.

246. To this head belong the burning of vegetable

table and animal matters, otherwiſe called *uſtion*, *incineration*, or *concremation*; and the change of metals into a powder, which in the fire either does not melt, or *vitrifies*, that is, runs into glaſs.

247. The metals which melt before ignition, are calcined by keeping them in fuſion for ſome time. The free admiſſion of air is eſſentially neceſſary to the ſucceſs of this operation; and hence, when the ſurface of the metal appears covered with calx, this muſt be taken off or raked to one ſide; otherwiſe, the remainder, excluded from the air, will not undergo the change intended. If any coal, or other inflammable matter that does not contain a mineral acid, be ſuffered to fall into the veſſel, the effect expected from this operation will not be produced, and part of what is already calcined will be *revived* or *reduced*; that is, it will return into its metallic form again.

248. Thoſe metals which require a ſtrong fire to melt in, calcine with a much leſs heat than is ſufficient to make them flow. Hence the burning or *ſcorification* of ſuch iron or copper veſſels as are long expoſed to a conſiderable fire without defence from the air. Gold and ſilver are not calcinable by any degree of fire.

249. In calcination, the metals viſibly emit fumes; nevertheleſs, the weight of the calx proves greater than that of the metal employed. The antimonial regulus gains about one-eleventh part of its weight; zinc, ſometimes one-tenth; tin, above one-ſixth; and lead, in its converſion into minium, oftentimes one-fourth.

250. The calcination of metallic bodies (gold, ſilver, and mercury excepted) is greatly promoted by nitre. This ſalt, expoſed to the fire in conjunction with any inflammable ſubſtances, extricates their inflammable matter, and burſts with it into flame, accompanied with a hiſſing noiſe: this proceſs is uſually termed *deflagration* or *detonation*.

251. All the metallic calces and ſcoriæ are revived into their metallic ſtate, by fuſion with any vegetable or animal inflammable matter. They are all more difficult of fuſion than the reſpective metals themſelves; and ſcarcely any of them, thoſe of lead and biſmuth excepted, can be made to melt at all, without ſome addition, in the ſtrongeſt fire that can be produced in the common furnaces. The additions called *fluxes*, employed for promoting the fuſion, conſiſt chiefly of fixed alkaline ſalts: a mixture of alkaline ſalt with inflammable matter, as powdered charcoal, is called a *reducing flux*, as contributing at the ſame time to bring the calx into fuſion and to revive it into metal. Such a mixture is commonly prepared from one part of nitre and two parts of tartar; by grinding them well together, ſetting the powders on fire with a bit of coal or a red-hot iron, then covering the veſſel, and ſuffering them to deflagrate or burn, till they are changed into a black alkaline coaly maſs. This is the common reducing flux of the chemiſts; and is called from its colour, the *black flux*. Metallic calces, or ſcoriæ, mingled with twice their weight of this compound, and expoſed to a proper fire, in a cloſe-covered crucible, melt, and reſume their metallic form: but tho' they received an increaſe of weight in the calcination, the revived metal is always found to weigh conſiderably leſs than the quantity which the calx was made from.

For a more particular account of all theſe proceſſes, and an explanation of the principles on which they depend, ſee CHEMISTRY *paſſim*, and the articles themſelves as they occur in the order of the alphabet.

PART II. PREPARATIONS AND COMPOSITIONS;

Containing thoſe of the LONDON and EDINBURGH PHARMACOPOEIAS, as directed in the LAST editions.

CHAP. I.

Pharmaceutical PREPARATIONS.

SECT. I. *The more Simple Preparations.*

The preparation of EARTHY *and ſuch other pulverable bodies as will not diſſolve in water.*

252. Theſe ſubſtances are firſt to be pulveriſed in a mortar, and then levigated with a little water, upon a hard and ſmooth marble, into an impalpable powder: this is to be dried upon a chalk-ſtone, and afterwards ſet by for a few days, in a warm, or at leaſt very dry place. *L.*

253. After this manner are to be prepared,

254. *Verdegris.* L.

255. *Antimony.* L. E.

256. *Crab's claws.* L. E.

257. *Coral.* L. E.

258. *Chalk.* L. E. This is firſt to be powdered, and then well waſhed with water, till the latter comes off without either colour or taſte. *E.*

259. *Bezoar ſtone;* which is to be moiſtened in the levigation with ſpirit of wine inſtead of water. *L.*

260. *Calamine ſtone,* previouſly calcined, is to be had from thoſe who make braſs. *L. E.*

261. *Blood-ſtone.* L. E.

262. *Lapis lazuli.* E.

263. *Pearls.* L. E.

264. *Crab's eyes,* ſo called. L. E.

265. *Oyſter-ſhells,* waſhed clean from dirt, (L). The hollow ſhells are to be preferred to the plain, (E.) becauſe they contain more of the fine white earth in proportion to the rough outward coat; which laſt appears to be largely impregnated with marine ſalt.

266. *Egg-ſhells,* freed, by boiling, from the ſkin that adheres to them. *L.*

267. *Amber.* L.

268. *Tutty.* L. E.

269. In preparing antimony, calamine, and tutty, particular care ought to be taken to reduce them into the moſt ſubtle powder poſſible. *L.*

272. Some few ſubſtances are more advantageouſly levigated with ſpirit of wine than with water. Thus bezoar has the green colour, uſually expected in this coſtly preparation, conſiderably improved thereby. A little ſpirit may be added to the other animal-ſubſtances, if the weather is very hot, and large

Prepara-tions.

quantities of them are prepared at once, to prevent their running into putrefaction; an accident which, in thoſe circumſtances, ſometimes happens when they are levigated with water only. Crab's-eyes, which abound with animal gelatinous matter, are particularly liable to this inconvenience.

273. The caution given above for reducing antimony, calamine, and tutty, to the greateſt ſubtlety poſſible, demands particular attention. The tenderneſs of the parts to which the two laſt are uſually applied, requires them to be perfectly free from any admixture of groſs irritating particles. The firſt, when not thoroughly comminuted, might not only, by its ſharp needle-like ſpicula, wound the ſtomach, but likewiſe anſwers few valuable purpoſes as a medicine, proving either an uſeleſs load upon the viſcera, or at beſt paſſing off without any other ſenſible effect than an increaſe of the groſſer evacuations; whilſt, if reduced to a great degree of fineneſs, it turns out to be a medicine of conſiderable efficacy.

274. The moſt ſucceſsful method of obtaining theſe powders of the requiſite tenuity, is to waſh off the finer parts by means of water, and continue levigating the remainder till the whole becomes fine enough to remain for ſome time ſuſpended in the fluid. The proceſs is thus directed in the Edin. Pharm.

A quantity of water is to be poured upon the levigated powder, in a large veſſel, and the veſſel repeatedly ſhaken, that the finer parts of the powder may be diffuſed through the water: the liquor is then to be poured off, and ſet by till the powder ſettles. The groſs part, which the water would not take up, is to be further levigated, and treated in the ſame manner.

After this method are prepared antimony, calamine, tutty, bloodſtone, chalk, and lapis lazuli.

275. By this method, which is that commonly practiſed in the preparation of colours for the painter, powders may be obtained of any required degree of tenuity; and without the leaſt mixture of the groſs parts, which are always found to remain in them after long continued levigation: all the coarſer matter ſettles at firſt, and the finer powder continues ſuſpended in the water, longer and longer, in proportion to the degree of its fineneſs. The ſame proceſs may likewiſe be advantageouſly applied to other hard pulverable bodies of the mineral kingdom, or artificial preparations of them; provided they are not ſoluble in, or ſpecifically lighter than, water. The animal and abſorbent powders, crab's-claws, crab's-eyes, oyſter-ſhells, egg-ſhells, chalk, pearl, coral, and bezoar, are not well adapted to this treatment; nor indeed do they require it. Theſe ſubſtances are readily ſoluble in acid juices without much comminution: if no acid is contained in the firſt paſſages, they are apt to concrete, with the mucous matter uſually lodged there, into hard indiſſoluble maſſes; the greater degree of fineneſs they are reduced to, the more are they diſpoſed to form ſuch concretions, and enabled to obſtruct the orifices of the ſmall veſſels.

276. *The purification or trying of hog's lard and mutton ſuet.* L.

Chop them into ſmall pieces, and melt them by a gentle heat, with the addition of a little water; then ſtrain them from the membranes.

The uſe of the water is to prevent the fat from burning and turning black; which it does very effectually, though it ſomewhat prolongs the proceſs, and is likewiſe apt to be in part imbibed by the fat.

277. *The purification of viper's fat.* L.

Let the fat, ſeparated from the inteſtines, be melted by a gentle fire, and then preſſed thro' a thin linen cloth.

The quantity of this fat uſually purified at a time is ſo ſmall, that the heat may be eaſily regulated ſo as to prevent burning, without the addition of any water.

278. *The deſpumation or clarifying of honey.* L. E.

Let the honey be liquefied in a water-bath, (that is, by ſetting the veſſel containing the honey in a veſſel of hot water), and the ſcum which ariſes taken off.

The intention of this proceſs is to purify the honey from wax or other droſſy matters that have been united with it by the violence of the preſs in its ſeparation from the comb, and from meal and ſuch like ſubſtances which are ſometimes fraudulently mingled with it. When the honey is rendered liquid and thin by the heat, theſe lighter matters riſe freely to the ſurface.

279. *The drying of ſquills.*

Let the ſquill, cleared from its outer ſkin, be cut tranſverſely into thin ſlices, and dried with a very gentle heat. *L.* The operation is known to have been ſucceſsfully performed when the ſquill becomes brittle without loſing its acrimony and bitterneſs. *E.*

By this method the ſquill dries much ſooner than when only its ſeveral coats are ſeparated, as has been uſually directed; the internal part being here laid bare, which, in each of the entire coats, is covered with a thin ſkin, which impedes the exhalation of the moiſture. The root loſes, in this proceſs, four-fifths of its original weight; the parts which exhale appear to be merely watery: hence ſix grains of the dry root are equivalent to half a dram of it when freſh; a circumſtance to be particularly regarded in the exhibition of this medicine.

280. *The burning of ſponge.*

Burn the ſponge in a cloſe earthen veſſel, until it becomes black and eaſily friable, then powder it in a glaſs or marble mortar. *L.* The ſponge is to be cut in ſmall pieces, and well freed from earthy matters previous to the operation, and is to be frequently ſtirred during the time of burning. *E.*

This medicine, only lately received in the diſpenſatory, has been in uſe for a conſiderable time, and employed againſt ſcrophulous diſorders and cutaneous foulneſſes, in doſes of a ſcruple and upwards. Its virtues ſeem to depend upon a volatile ſalt, juſt formed and combined with its own oil; if the ſponge be diſtilled with a ſtronger heat, it yields a large proportion of that ſalt in its proper form. The ſalt is in this preparation ſo far extricated, that if the burnt ſponge be ground in a braſs mortar, it corrodes the metal, ſo as to contract a diſagreeable taint, and ſometimes an emetic quality.

A good deal of addreſs is requiſite for managing this proceſs in perfection. The ſponge ſhould be cut ſmall, and beaten for ſome time in a mortar, that all the ſtony matters may be got out, which, compared with the weight of the ſponge when prepared, will ſometimes amount to a conſiderable quantity. The burning ſhould be diſcontinued as ſoon as ever the matter is become thoroughly black. If the quantity put into the veſſel at once is large, the outſide will be ſufficiently burnt before the inſide is affected; and the volatile ſalt of the former will in part eſcape before that in the latter is begun to be formed. The beſt method of avoiding this inconvenience ſeems to be, to keep the ſponge continually ſtirring, in ſuch a machine as is uſed for the roaſting of coffee.

281. *The calcination of hartſhorn.* L.

Burn pieces of hartſhorn in a potter's furnace, till they become perfectly white; then powder and levigate them after the ſame manner as the other earthy bodies.

The intention here is, totally to burn out and expel the oil, ſalt, and other volatile parts, ſo as to leave only a white inſipid animal earth. For this purpoſe, a ſtrong fire and the free admiſſion of air are neceſſary. The potter's furnace is directed merely for the ſake of convenience; where this is not to be had, any common furnace or ſtove may be made to ſerve: on the bottom of the grate ſpread ſome lighted charcoal, and above this lay the horns. The whole will burn vehemently; the vegetable matter is reduced to aſhes; and the horns are burnt to whiteneſs, ſtill retaining their original form, by which they are eaſily diſtinguiſhed from the other: they ought to be ſeparated as ſoon as grown cold, to prevent their imbibing any fixed ſalt from the vegetable aſhes moiſtened by the air. The horns left after the diſtillation of the volatile ſalt and oil of hartſhorn are as proper for this uſe as any other; that proceſs only collecting ſuch parts as are here diſſipated in the air.

Calcined hartſhorn is the pureſt of the animal abſorbent powders; as being perfectly free from any glutinous or oily matter, which moſt of the others abound with. It appears nevertheleſs to be one of the weakeſt in abſorbent power, or the moſt difficult of ſolution in acids.

282. *The extraction of pulps.* L.

Unripe pulpy fruits, and ripe ones if they are dry, are to be boiled in a ſmall quantity of water until they become ſoft; then preſs out the pulp thro' a ſtrong hair-ſieve, and afterwards boil it down to a due conſiſtence, in an earthen veſſel, over a gentle fire; taking care to keep the matter continually ſtirring, to prevent its burning.

283. The pulp of caſia fiſtularis is in like manner to be boiled out from the bruiſed pod, and reduced afterwards to a proper conſiſtence, by evaporating the water.

284. The pulps of fruits that are both ripe and freſh, are to be preſſed out thro' the ſieve, without any previous boiling.

285. *The ſtraining of ſtorax.* L.

Soften ſtorax calamita in hot water; then preſs it out betwixt warm iron plates; and ſeparate the ſtorax, now purified, from the water.

The ſtorax commonly met with, ſtands greatly in need of purification. It contains a large quantity of woody matter, which this proceſs effectually frees it from, though in other reſpects liable to ſome inconveniences. The woody ſubſtance in ſome meaſure defends the ſtorax from the action of the preſs, and retains part of it behind; at the ſame time that the ſtorax is apt to ſuffer a conſiderable diſſipation of its volatile parts, in which its fragrance and principal virtue conſiſt. To prevent as much as poſſible this laſt inconvenience, the operator ought carefully to avoid uſing a greater heat than is abſolutely neceſſary; and as ſoon as the ſtorax is ſufficiently ſoftened, to be expeditious in the ſtraining of it.

Storax may be excellently purified by means of ſpirit of wine, which this reſin totally diſſolves in, ſo as to paſs thro' a filtre, the impurities alone being left. If the ſtorax is afterwards wanted in a ſolid form, it may be recovered from this ſolution by gently diſtilling off the ſpirit, which will elevate very little of its flavour, or by pouring to it a quantity of water. See Sect. vi. § 3.

286. *Strained opium, or the Thebaic extract.* L.

Take of opium, cut into ſlices, one pound; diſſolve it into the conſiſtence of a pulp, in a pint of boiling water, with care to prevent its burning; and whilſt it remains quite hot, ſtrongly preſs it from the feces, thro' a linen-cloth; the ſtrained opium is then to be reduced, by a water-bath or other gentle heat, to its original conſiſtence.

Opium, thus ſoftened by a ſmall quantity of water, paſſes the ſtrainer entire, the fæces only being left behind. If it was diſſolved in a large quantity of water, its reſinous and gummy parts would be ſeparated from one another.

Where large quantities of opium are purified at once, the inſpiſſation is moſt commodiouſly performed in a water-bath; but ſmall quantities may be very ſafely inſpiſſated, by placing the veſſel immediately over a gentle fire, the matter being kept ſtirring, and the veſſel occaſionally removed from the fire whenever there is any ſuſpicion of its becoming too hot. The groſſer impurities of the opium are by this proceſs effectually ſeparated; but ſome of its heterogeneous admixtures, conſiſting chiefly of duſt and farinaceous matters, are ſo fine, as partly to paſs along with it through the pores of the ſtrainer when dilated by the preſs: this manifeſtly appears upon boiling the ſtrained opium in water, and afterwards in ſpirit; when a conſiderable quantity of earthy matter will be left, which is not ſoluble in either of thoſe menſtrua.

287. The other gums, as ammoniacum, galbanum, aſafœtida, and the like, are purified after the ſame manner; only here a larger quantity of water may be made uſe of without injury. If the reſinous part happens to ſubſide, take it out, and reſerve it to be added again towards the end of the inſpiſſation, that it may unite with the reſt into one uniform maſs.

Any gum that melts eaſily, as galbanum, may likewiſe be purified by including it in a bladder, and keeping it in boiling water, until the gum becomes ſoft enough to be preſſed from its impurities through a canvas ſtrainer. *L.*

288. *Preparation of millepedes, &c.*

The millepedes are to be incloſed in a thin canvaſs-cloth, and ſuſpended over hot ſpirit of wine, in a cloſe veſſel, till they are killed by the ſteam, and rendered friable. *L. E.*

Purification of iron filings.—Let the filings be laid upon a ſieve, and a magnet applied below, ſo that they may be gradually attracted through it. *E.*

Preparation of iron filings.—Let purified filings of iron be laid in a moiſt place till they fall down in ruſt, which is to be rubbed into an exceeding fine powder. *E.*

SECT. II. *Subſtances extracted from Vegetables by Expreſſion.*

§. 1. JUICES.

289. JUICES are obtained from the ſucculent parts of plants, by including them, after being properly cut, bruiſed, &c. in a hair-bag, and preſſing them, betwixt wooden cheeks, in the common ſcrew-preſs, as long as any liquor drops from them.

290. The harder fruits require to be previouſly well beaten or ground; but herbs are to be only moderately bruiſed; for if theſe are over bruiſed, a large quantity of the herbaceous matter will be forced out along with the juice. Hempen or woollen bags are apt to communicate a diſagreeable flavour; the threads of theſe likewiſe ſwell in proportion as they imbibe moiſture, ſo as in great meaſure to prevent the free percolation of the juice.

291. The fluids thus extracted from ſucculent fruits, both of the acid and ſweet kind; from moſt of the acrid herbs, as ſcurvy-graſs and water-creſſes; from the acid herbs, as ſorrel and wood-ſorrel; from the aperient lacteſcent plants, as dandelion and hawkweed; and from ſundry other vegetables, contain great part of the peculiar taſte and virtues of the reſpective ſubjects. The juices, on the other hand, extracted from moſt of the aromatic herbs, as thoſe of mint and the fragrant Turkey balm, commonly called *balm* of *gilead*, have ſcarce any thing of the flavour of the plants, and ſeem to differ little from decoctions of them, made in water, boiled till the volatile odorous parts have been diſſipated. Many of the odoriferous flowers, as the lily, violet, hyacinth, not only impart nothing of their fragrance to their juice, but have it totally deſtroyed by the previous bruiſing. From want of ſufficient attention to theſe particulars, practitioners have been frequently deceived in the effects of preparations of this claſs: juice of mint has been often preſcribed as a ſtomachic, though it wants thoſe qualities by which mint itſelf, and its other preparations, operate in that intention.

292. The juices thus forcibly preſſed out from plants, differ from thoſe which flow ſpontaneouſly or from inciſions; theſe laſt conſiſting chiefly of ſuch fluids as are not diffuſed through the whole ſubſtance of the vegetable ſubject, but elaborated in diſtinct veſſels, or ſecreted into particular receptacles. From poppy-heads, ſlightly wounded, there iſſues a thick milky liquor, which dries, by a moderate warmth, into opium; whilſt the juice obtained from them by preſſure is of a dark green colour, and far weaker virtue.

293. Juices newly expreſſed are generally thick, viſcid, and very impure: by colature, a quantity of groſs matter is ſeparated, the juice becomes thinner, limpid, and better fitted for medicinal purpoſes, though as yet not entirely pure: on ſtanding, it becomes again turbid, and apt to run into a fermentative or putrefactive ſtate. Clarification with whites of eggs renders the juices more perfectly fine; but there are few that will bear this treatment without a manifeſt injury to their flavour, taſte, and virtue.

294. The moſt effectual method of purifying and preſerving theſe liquors is, to let the ſtrained liquors ſtand in a cool place till they have depoſited their groſſer feces, and then gently paſs them ſeveral times thro' a fine ſtrainer till perfectly clear; when about $\frac{1}{40}$th part their weight of good ſpirit of wine may be added, and the whole ſuffered to ſtand as before: a freſh ſediment will now be depoſited, from which the liquor is to be poured off, ſtrained again, and put into ſmall bottles that have been waſhed with ſpirits and dried. A little oil is to be poured on the ſurface, ſo as very nearly to fill the bottles, and the mouths cloſed with leather, paper, or ſtopped with ſtraw, as the flaſks in which Florence wine is brought to us: this ſerves to keep out duſt, and ſuffers the air, which in proceſs of time ariſes from all vegetable liquors, to eſcape; which air would otherwiſe endanger the burſting of the glaſſes, or, being imbibed afreſh, render their contents vapid and foul. The bottles are to be kept on the bottom of a good cellar or vault, placed up to the necks in ſand. By this method, juices may be preſerved a year or two; and ſome for much longer time.

295. *The ſcorbutic juices, &c.*

Take of the juice of garden ſcurvy-graſs, two pints; brooklime, water-creſſes, each one pint; Seville oranges, a pint and quarter. Mix them together, let them ſtand till the feces have ſubſided, and then either pour the liquor off clear, or paſs it through a ſtrainer. *L.*

Take of juice of garden ſcurvy-graſs, oranges, water-creſſes, each two pints; ſpirituous nutmeg-water, half a pint. Mix all together, and ſet by the liquor till the feces have ſubſided; then pour off the clear. *E.*

Theſe juices are of conſiderable uſe for the purpoſes expreſſed in the title; and may be taken, from an ounce or two to a quarter of a pint, two or three times a day. They generally increaſe the urinary ſecretion, and ſometimes introduce a laxative habit.

296. *Inſpiſſated juice, commonly called* extract, *of wolfſbane.*

Let the freſh leaves of wolfſbane be included in a canvas bag, and ſtrongly ſqueezed in a preſs, in order to give out their juice, which is to be inſpiſſated to the conſiſtence of thick honey, in veſſels expoſed to the ſteam of boiling water, keeping it carefully ſtirring towards the end.

After the ſame manner are prepared the inſpiſſated juices or extracts of belladonna, flammula jovis, hyoſciamus, and ſtramonium. *E.*

297. *Inſpiſſated juice, or extract, of hemlock.*

Having expreſſed the juice of the freſh leaves and ſtalks of hemlock while in flower, as directed for wolfſbane,

bane, and inſpiſſated it to the conſiſtence of honey; let the whole cool, and then add as much of the powder of dried hemlock-leaves as is ſufficient to make the maſs of a due conſiſtency for pills. Care, however, muſt be taken, that the evaporation proceed only as far as to admit about a fifth part of the powder.

§ 2. Expressed oils.

298. Expressed oils are obtained chiefly from certain ſeeds and kernels of fruits, by thoroughly pounding them in a ſtone-mortar, or, where the quantities are large, grinding them in mills, and then including them in a canvas bag, which is wrapped in a hair-cloth, and ſtrongly preſſed betwixt iron plates. The canvas, if employed alone, would be ſqueezed ſo cloſe to the plates of the preſs as to prevent the oil from running down: by the interpoſition of the hair-cloth, a free paſſage is allowed it.

299. Sundry machines have been contrived both for grinding the ſubject and preſſing out the oil, in the way of buſineſs. To facilitate the expreſſion, it is cuſtomary to warm either the plates of the preſs, or the ſubject itſelf after the grinding, by keeping it ſtirring in a proper veſſel over the fire: the oil, liquefied by the heat, ſeparates more freely and more plentifully. When the oil is deſigned for medicinal purpoſes, this practice is not to be allowed: for heat, eſpecially if its degree is ſufficient to be of any conſiderable advantage for promoting the ſeparation, renders the oil leſs ſoft and palatable, impreſſes a diſagreeable flavour, and increaſes its diſpoſition to grow rancid: hence the colleges both of London and Edinburgh expreſsly require the operation to be performed without heat.

Nor are the oils to be kept in a warm place after their expreſſion. Expoſed but for a few days to a heat no greater than that of the human body, they loſe their emollient quality, and become highly rancid and acrimonious. Too much care cannot be taken for preventing any tendency to this acrid irritating ſtate, in medicines ſo often uſed for abating immoderate irritation.

So much are theſe oils diſpoſed to this injurious alteration, that they frequently contract an acrimony and rancidity while contained in the original ſubjects. Hence great care is requiſite in the choice of the unctuous ſeeds and kernels, which are often met with very rancid: almonds are particularly liable to inconveniences of this kind.

300. Expreſſed oils are prepared for mechanic uſes from ſundry different ſubjects, as nuts, poppy-ſeed, hemp-ſeed, rape-ſeed, and others. Thoſe directed for medicinal purpoſes in the London and Edinburgh Pharmacopœias, are,

301. *Oil of almonds.* L. E.
302. *Oil of linſeed.* L. E.
303. *Oil of muſtard ſeed.* L.
304. *Oil of ricinus.* E.

305. The oil of almonds is prepared from the ſweet and bitter almonds indifferently; the oils obtained from both ſorts being altogether the ſame. Nor are the differences of the other oils very conſiderable, the diſcriminating qualities of the ſubjects not reſiding in the oils that are thus obtained by expreſſion: the oil of muſtard-ſeed is as ſoft, inſipid, and void of pungency, as that of ſweet almonds, the pungency of the muſtard remaining entire in the cake left after the expreſſion. The ſeveral oils differ in ſome of their properties from one another; but in medicinal qualities they appear to be all nearly alike, and agree in one common emollient virtue. They ſoften and relax the ſolids, and obtund acrimonious humours: and thus become ſerviceable, internally, in pains, inflammations, heat of urine, hoarſeneſs, tickling coughs, &c.; in glyſters, for lubricating the inteſtines, and promoting the ejection of indurated fæces; and in external applications for tenſion and rigidity of particular parts. Their common doſe is half an ounce: in ſome caſes, they are given to the quantity of three or four ounces. The moſt commodious forms of their exhibition we ſhall ſee hereafter, in the ſection of *Emulſions*.

306. The oils expreſſed from aromatic ſubſtances differ from the foregoing, in retaining for the moſt part an admixture of the aromatic matter of the ſubject. Thus nutmegs and mace yield, upon expreſſion, an oil impregnated with the flavour of the ſpices; and an oil expreſſed from aniſeeds, has a great ſhare of the peculiar ſmell of the ſeeds. A purgative oil alſo is extracted in America from the purgative ſeeds of the ricinus. It does not appear that other qualities of vegetables are communicated to their expreſſed oils.

307. The rinds of the ſeveral varieties of oranges, lemons, and citrons, yield by a kind of expreſſion their eſſential oils almoſt pure, and nearly ſimilar to thoſe which are obtained from them by diſtillation. The eſſential oils, in which the fragrance and aromatic warmth of theſe fruits reſide, are contained in numerous little veſicles, which may be diſtinguiſhed by the naked eye, ſpread all over the ſurface of the peel. If the rind is cut in ſlices, and the ſlices ſeparately doubled or bent in different parts, and ſqueezed between the fingers, the veſicles burſt at the bending, and diſcharge the oil in a number of fine ſlender jets. A glaſs-plate being ſet upright in a glaſs or porcelane veſſel, and the ſlices ſqueezed againſt the plate, the little jets unite into drops upon the plate, and trickle down into the veſſel beneath. But though this proceſs affords the true native oil, in the ſame ſtate wherein it exiſted in the ſubject, unaltered by fire or other agents, it is not practicable to advantage, unleſs where the fruit is very plentiful, as only a ſmall part of the oil it contains can thus be extracted or collected.

The oil is more perfectly ſeparated by rubbing the rind upon a lump of ſugar. The ſugar, by the inequality of its ſurface, produces the effect of a raſp in tearing open the oily veſicles; and in proportion as the veſicles are opened, the ſugar imbibes the oil. When the outward part of the lump is ſufficiently moiſtened, it is ſcraped off, and the operation continued on the freſh ſurface. The oil thus combined with the ſugar, is fit for moſt of the uſes to which it is applied in a fluid ſtate. Indeed, the pure eſſential oils obtained by diſtillation are often purpoſely mixed with ſugar, to render their uſe the more commodious.

Sect. III. *Infuſions in different Menſtrua.*

§ 1. Infusions and Decoctions in Water.

Water, the direct menſtruum of gums and ſalts, extracts readily the gummy and ſaline parts of vegetables, Its action, however, is not limited to theſe;

the reſinous and oily principles being, in moſt vegetables, ſo intimately blended with the gummy and ſaline, as to be in great part taken up along with them: ſome of the reſinous cathartics, and moſt of the aromatic herbs, as well as bitters and aſtringents, yield to water the greateſt part of their ſmell, taſte, and medicinal virtue. Even of the pure eſſential oils and odorous reſins of vegetables, ſeparated from the other principles, water imbibes a part of the flavour; and by the artificial admixture of gummy or ſaline matter, the whole ſubſtance of the oil or reſin is made diſſoluble in water.

308. Of pure ſalts, water diſſolves only certain determinate quantities, (ſee n° 162): by applying heat, it is generally enabled to take up more than it can do in the cold, and this in proportion to the degree of heat; but as the liquor cools, this additional quantity ſeparates, and the water retains no more than it would have diſſolved without heat. With gummy ſubſtances, on the other hand, it unites unlimitedly, diſſolving more and more of them till it loſes its fluidity: heat expedites the action of the water, but cannot enable it to take up more than it would do, by allowing it longer time in the cold. The active parts extracted from moſt vegetables by water, and oils and reſins made ſoluble in water by the artificial admixture of gum, partake of this property of pure gums, being diſſoluble without ſaturation.

309. It has been imagined that vegetables in a freſh ſtate, while their oily, reſinous, and other active parts, are already blended with a watery fluid, would yield their virtues to water more freely and more plentifully than when their native moiſture has been diſſipated by drying. Experience however ſhews, that dry vegetables in general give out more than freſh ones, water ſeeming to have little action upon them in their recent ſtate. If, of two equal quantities of mint, one be infuſed freſh in water, and the other dried and then infuſed in the like quantity of water for the ſame length of time, the infuſion of the dry herb will be remarkably the ſtrongeſt: and the caſe appears to be the ſame in all the vegetables that have been tried.

310. In all the preparations deſcribed in this ſection, it is to be underſtood that the ſubjects muſt be moderately and newly dried; unleſs when they are expreſsly ordered to be taken freſh; in which caſe it is to be judged that their virtues are deſtroyed or impaired by drying.

311. The native colours of many vegetables are communicated to water along with their medicinal matter: many impart a colour different from their own; and others, tho' of a beautiful and deep colour themſelves, give ſcarcely any to the menſtruum. Of the firſt kind are the yellow and red flowers; of the ſecond, the leaves of moſt plants; of the third, ſome of the blue flowers, as thoſe of cyanus and larkſpur. Acid liquors change the infuſions of moſt flowers, the yellow ones excepted, to a red; and alkalies, both fixed and volatile, to a green.

312. From animal-ſubſtances, water extracts the gelatinous and nutritious parts, whence glues, gellies, broths, &c.; and along with theſe, it takes up principles of more activity, as the acrid matter of cantharides. It diſſolves alſo ſome portion of calcined calcareous earths, both of the animal and of the mineral kingdom, but has no action on any other kind of earthy matter.

Art. i. *Infuſions in* COLD *Water.*

313. *Infuſion of carduus.*

Take an ounce of the dried leaves of carduus benedictus, and a pint of common water; let them ſteep for ſix hours without heat, and then filter the liquor through paper.

By this management, only the finer parts of the carduus are extracted, and the infuſion proves an agreeable light bitter: it ſits eaſier on the ſtomach than any other medicine of the bitter kind; whereas, by long continued maceration, or by the application of heat, the groſſer and more ungrateful parts are taken up, and the liquor becomes nauſeous, ſo as to provoke vomiting. The light infuſion is often given with great benefit in weakneſſes of the ſtomach, where the common bitters do not agree. It may be flavoured at pleaſure with aromatic materials; inſtead of pure water, a mixture thereof with ſome grateful diſtilled ſpirituous water, as 12 ounces of common water, and four of the ſpirituous water of orange-peel, may be uſed for the menſtruum. The little quantity of ſpirit contained in this compound will not conſiderably vary the diſſolving power of the water.

314. Many other vegetables may be advantageouſly treated in the ſame manner. From thoſe which are weak in virtue, rich infuſions may be obtained, by returning the liquor upon freſh quantities of the ſubject, the water loading itſelf more and more with the active parts. Theſe loaded infuſions are doubtleſs applicable to valuable purpoſes in medicine, as they contain, in a ſmall compaſs, the finer, more ſubtle, and active principles of vegetables, in a form readily miſcible with the fluids of the human body.

315. *Tincture of mint.* E.

Take half an ounce of the dry leaves of ſpearmint, and a pint of ſimple mint-water. Steep them in a cloſe veſſel, in a warm place, for four hours, and then ſtrain out the tincture.

The diſtilled water of mint is impregnated with as much of the volatile parts of the herb, as water can be made to retain by diſtillation. By infuſion, however, it ſtill takes up more, being equally effectual, as a menſtruum, with freſh water; hence the tincture proves very rich in the virtue of the mint. This is another uſeful method of obtaining ſtrong infuſions from vegetables, and it may be varied at diſcretion; the diſtilled water of one plant may be employed as a menſtruum for another.

316. *Infuſion of Peruvian bark.*

Take an ounce of Peruvian bark reduced into fine powder, and twelve ounces of water. Macerate without heat for twenty-four hours, occaſionally ſhaking the veſſel; then pour off the clear liquor, and paſs it through a fine ſtrainer.

The infuſion appears to be one of the beſt preparations of the bark for weak ſtomachs, and may be given in doſes of two or three ounces, in intermitting fevers, and in other diſorders where the corroborating virtues of bark are required.

317. *Tar-water.*

Take of tar, two pounds; water, one gallon. Stir them ſtrongly together with a wooden rod; and after ſtanding to ſettle for two days, pour off the water for uſe.

Tar-water was ſome time ago recommended to the world as a certain and ſafe medicine in almoſt all diſeaſes; a ſlow yet effectual alterative in cachexies, ſcurvies, chlorotic, hyſterical, hypochondriacal, and other chronical complaints; and a ſudden remedy in acute diſtempers which demand immediate relief, as pleuriſies, peripneumonies, the ſmall-pox, and all kinds of fevers in general. The medicine, though certainly far inferior to the character that has been given of it, is doubtleſs, in many caſes, of conſiderable utility: it ſenſibly raiſes the pulſe, and occaſions ſome conſiderable evacuation, generally by perſpiration or urine, though ſometimes by ſtool or vomit: hence it is ſuppoſed to act by increaſing the vis vitæ, and enabling nature to expel the morbific humors.

318. *Lime-water.*

Take a pound of quicklime, and a gallon and a half of water. Pour the water gradually upon the lime; and when the ebullition is over, let the whole ſtand to ſettle; then filter the liquor through paper. *L.*

Take a pound of freſh burnt quicklime, and two gallons of water. Pour the water by little and little upon the lime; and when the ebullition is over, ſtrongly ſhake the veſſel; then let the whole ſtand at reſt, that the lime may ſettle; and after two days filter the liquor, which is to be kept in veſſels cloſely ſtopped. *E.*

A lime-water may be prepared in the ſame manner from calcined oyſter-ſhells.

321. Lime-water has been found of great ſervice in ſcrophulous and ſcorbutic complaints; in ſome kinds of alvine fluxes, female weakneſſes, and other diſorders proceeding from a laxity and debility of the ſolids; particularly in corpulent and phlegmatic habits. It appears likewiſe to be poſſeſſed of a lithontriptic power, and in ſundry calculous caſes has procured conſiderable relief: the lime-water prepared from calcined oyſter-ſhells is found to be, in this intention, more efficacious than that of the common ſtone or chalk lime. It is given internally, in the doſe of a quarter of a pint, three or four times a-day; and likewiſe uſed externally for waſhing foul ulcers.

Compound lime-water. E.

Take of ſaſſafras, root and bark, ſhaved, two ounces; nutmegs, well bruiſed, three drams; liquorice, ſliced, one ounce; lime-water, freſh prepared, four pints. Digeſt them together for two days, in a very cloſe veſſel; and then ſtrain the liquor.

Lime-water leſs compounded. L.

Take of liquorice, one ounce; ſaſſafras-bark, half an ounce; ſimple lime-water, ſix pints. Macerate without heat for two days; and then ſtrain the liquor.

Lime-water more compounded. L.

Take of guaiacum wood, ſhaved, half a pound; liquorice, one ounce; ſaſſafras-bark, half an ounce; coriander-ſeeds, three drams; ſimple lime-water, ſix pints. Macerate without heat for two days; and then ſtrain off the liquor.

In all theſe compoſitions, the additional articles take off the ill flavour of the lime-water, render it more grateful both to the palate and ſtomach, and at the ſame time conſiderably promote its medicinal efficacy, eſpecially when intended againſt cutaneous diſorders, and foulneſs of the blood and juices. They may be taken in the ſame quantities as the ſimple lime-water, and continued for ſome time; the patient keeping moderately warm during their uſe.

319. *The Cretaceous potion.*

Take of prepared chalk, gum arabic, of each one ounce; fine ſugar, half an ounce; common water, two pints; ſpirituous nutmeg-water, two ounces. Mix them together. *E.*

Art. ii. *Infuſions in* BOILING *Water.*

320. *Simple bitter infuſion.* L.

TAKE of gentian root, freſh yellow rind of lemon-peel, carefully freed from the inner white part, each half an ounce; dry yellow rind of Seville orange-peel, freed in like manner from the white, one dram and a half; boiling water, three quarters of a pint. Macerate for an hour or two; then filter the liquor through paper, or paſs it through a ſtrainer, without preſſure.

This is a very elegant and uſeful bitter; as agreeable to the taſte as can well be contrived, the pills communicating a fine flavour; which is the only addition that the gentian ſtands in need of.

321. *Purging bitter infuſion.* L.

Take of ſena, yellow rind of lemon-peel, freſh, each three drams; gentian root, yellow rind of Seville orange-peel, dry; leſſer cardamom-ſeeds, freed from the huſks, each half a dram; boiling water, five ounces by meaſure. Macerate them together; and when cold, ſtrain off the liquor.

322. *Bitter infuſion with ſena.* E.

Take of ſena, one dram; gentian root, ſweet fennel-ſeeds, each half a dram; boiling water, a quarter of a pint. Infuſe them for four hours, and then ſtrain the liquor.

This infuſion may likewiſe be prepared with two, three, or more times the quantity of ſena.

Both theſe are uſeful purging bitters. The quantities here preſcribed are intended for one doſe; the firſt is the largeſt, and the other the ſmalleſt doſe in which ſena is uſually given.

323. *Common infuſion of ſena.* L.

Take of ſena, an ounce and a half; cryſtals of tartar, three drams; leſſer cardamom-ſeeds, freed from the huſks, two drams; water, one pint. Boil the cryſtals of tartar in the water until they are diſſolved; then pour the water, whilſt it continues boiling, upon the other ingredients; and when cold, ſtrain off the liquor for uſe.

In the former L. Pharmacopœia, an alkaline ſalt was uſed in the infuſion of ſena, inſtead of the acid one here directed. The firſt was ſuppoſed to promote the operation of the medicine, by ſuperadding a degree of purgative virtue of its own, and by enabling the water to extract ſomewhat more from the capital ingredient than it would be capable of doing by itſelf; whilſt acids have rather a contrary effect. Experience, however, has ſufficiently ſhown, that this infuſion, and the following one with lemon-juice, do not fail in their intention; and, in a medicine very nauſeous to many, it is of principal conſequence to prepare it ſo, that the lighteſt and leaſt diſguſtful parts may be extracted. Alkaline ſalts increaſe the offenſiveneſs of the ſena; whilſt cryſtals of tartar conſiderably improve the colour of the infuſion, and likewiſe render the taſte to ſome perſons leſs diſagreeable. Soluble tartar ſhould ſeem a good ingredient in theſe kinds of compoſitions, as it not only improves the taſte, but promotes the purgative virtue of the medicine: this addition alſo renders the infuſion leſs apt to gripe or occaſion flatulencies.

324. *Infuſion of ſena with lemon.* L.

Take of ſena, an ounce and a half; yellow rind of lemon-peel, freſh, one ounce; lemon-juice, one ounce by meaſure; boiling water, one pint. Macerate them together; and when cold, ſtrain off the infuſion.

This is a very pleaſant and ſufficiently efficacious purge: the Committee obſerve, that it is the moſt agreeable form they have been able to contrive for the exhibition of ſena to ſuch as are more than ordinarily offended with its flavour. The doſe is from two ounces to four.

325. *Infuſion of tamarinds with ſena.* L.

Take of tamarinds, ſix drams; cryſtals of tartar, ſena-leaves, of each one dram; coriander-ſeeds, half a dram; brown ſugar, half an ounce; boiling water, eight ounces. Macerate the ingredients in a cloſe earthen veſſel unglazed, ſhaking it now and then. After four hours ſtrain off the liquor. This infuſion may be made with a double or triple quantity of ſena.

326. *Infuſion of rhubarb.* E.

Take of rhubarb, half an ounce; boiling water, half a pint. Infuſe them for a night, and to the ſtrained liquor add one ounce of ſpirituous cinnamon-water.

This appears to be one of the beſt preparations of rhubarb when deſigned as a purgative; water extracting its virtue more effectually than either vinous or ſpirituous menſtrua: in this reſpect rhubarb differs from moſt of the other vegetable cathartics.

327. *Infuſion of flammula jovis.* E.

Take of the dried leaves of the flammula jovis, two drams; boiling water, one pint. Macerate for a quarter of an hour; then let the liquor boil a little, and ſtrain it. This may be made alſo with three or four drams of flammula jovis.

328. *Tincture of roſes.*

Take of red roſe-buds, freed from the white heels, half an ounce; ſtrong ſpirit (called *oil*) of vitriol, one ſcruple; boiling water, two pints and a half; double-refined ſugar, one ounce and a half. Firſt mingle the ſpirit of vitriol with the water in a glaſs or glazed earthen veſſel, and in this mixture macerate the roſes; when the liquor is grown cold, ſtrain it, and add the ſugar. *L.*

Take of red roſes, cleared from the heels and dried, one ounce; ſpirit of vitriol, one dram; boiling water, four pints; white ſugar, two ounces. Macerate the roſes with the boiling water for four hours in an unglazed earthen veſſel; then add the acid, and, after the liquor is ſtrained, the ſugar. *E.*

This tincture is of an elegant red colour, and makes a very grateful addition to juleps in hæmorrhages, and all caſes that require mild coolers and ſubaſtringents: it is ſometimes taken with boluſes or electuaries of the bark; and likewiſe makes a good gargle.

329. *Mucilage of gum-arabic.* E.

Take of gum-arabic in powder, four ounces; hot water, ſix ounces; mix them, diligently rubbing them together all the time, and ſtrain through a linen cloth.

330. *Mucilage of gum tragacanth.* E.

Take of gum tragacanth in powder, one ounce; hot water, half a pint. Macerate for 24 hours; then rub the ingredients well together, and ſqueeze the mucilage through a linen-cloth.

Art. iii. DECOCTIONS.

331. THE effect of boiling differs from that of infuſion in ſome material particulars. One of the moſt obvious differences is, that as the eſſential oils of vegetables, in which their ſpecific odours reſide, are volatile in the heat of boiling water, they exhale in the boiling along with the watery ſteam, and thus are loſt to the remaining decoction; whereas both in cold and hot infuſions they are preſerved. Odorous ſubſtances, and thoſe in general whoſe virtues depend on their volatile parts, are therefore unfit for this treatment. The ſoluble parts of theſe may, nevertheleſs, be united in this form with thoſe of bodies of a more fixed nature, by boiling the latter till their virtues are ſufficiently extracted, and then infuſing the former in this decoction.

332. The extraction of the virtue of the ſubject is uſually promoted or accelerated by a boiling heat; but this rule is leſs general than it is commonly ſuppoſed to be. We have already obſerved, that Peruvian bark gives out its virtue more perfectly by cold infuſion than by coction. In ſome caſes, boiling occaſions a manifeſt diſunion of the principles of the ſubject: thus, when almonds are triturated with cold water, their oil, blended with the mucilaginous or other ſoluble matter of the almond, unites with the water into a milky liquor called an *emulſion*; but on boiling them in water, the oil ſeparates and riſes to the ſurface; and if the moſt perfect emulſion be made to boil, a like ſeparation happens.

333. *The white decoction.* L.

Take of calcined hartſhorn, prepared, two ounces; gum-arabic, two drams; water, three pints. Boil them till only two pints remain; and then ſtrain off the liquor.

This decoction is uſed as common drink in acute diſeaſes attended with a looſeneſs, and where acrimonious humours abound in the *primæ viæ*. The gum is added in order to render the liquor lightly glutinous, and thus enable it to ſuſtain more of the calx; which is the ingredient that the colour, but probably not the virtue, of the medicine depends upon. Calcined hartſhorn has no quality from which it ſeems capable either of conſtringing and ſtrengthening the veſſels, giving a greater degree of conſiſtency to thin fluids, or obtunding acrimonious humours. It blunts and abſorbs acid juices; but acrimony and acidity are very different: there are few (perhaps none of the acute) diſorders of adults attended with the latter; and few of infants are unaccompanied therewith. Some have propoſed ſtarch as an ingredient in theſe kinds of decoctions; a ſmall quantity of this ſoft gelatinous, farinaceous ſubſtance ſhould ſeem to be greatly preferable to the earthy calx. It may be obſerved, that the water is not enabled by the boiling to diſſolve any part of the calx; and that in the decoction the earth is only diffuſed in ſubſtance thro' the water, as it would be by agitation.

334. *Decoction of the woods.* E.

Take of guaiacum ſhavings, three ounces; raiſins of the ſun, ſtoned, two ounces; ſaſſafras wood ſhaved, liquorice ſliced, of each one ounce; water, one gallon. Boil the guaiacum and raiſins with the water, over a gentle fire, to the conſumption of one half: adding towards the end, the ſaſſafras and liquorice. Strain out the liquor without preſſure.

This decoction is very well contrived; and if its uſe is duly continued, will do great ſervice in ſome cutaneous diſeaſes, foulneſs of the blood and juices, and ſome diſorders of the breaſt; particularly in cold phlegmatic habits. It may be taken by itſelf in the quantity of a quarter of a pint, two or three times a-day, or uſed as an aſſiſtant in a courſe of mercurial or antimonial alteratives; the patient in either caſe keeping warm, in order to promote the operation of the medicine.

335. *Decoction of marſhmallow root.* E.

Take of marſhmallow root, moderately dried, ſix ounces; large raiſins, ſtoned, two ounces; common water, ſix pints. Boil to four pints, adding the other ingredients towards the end. Strain out the liquor, and let it ſettle till fine.

This decoction is intended chiefly as an emollient, to be liberally drank of in nephritic paroxyſms; in which caſes, by ſoftening and relaxing the parts, it frequently relieves the pain, and procures an eaſy paſſage for the ſabulous matter. Two or three ounces of this decoction may be taken for a doſe.

336. *Pectoral decoction.* L.

Take common barley, ſtoned raiſins, figs, each two ounces; liquorice, half an ounce; water, four pints. Firſt boil the water with the barley, then add the raiſins, and laſtly (juſt before the end of the proceſs) the figs and liquorice; the boiling is to be continued ſo long, that the liquor, when ſtrained, may be no more than two pints. *L.*

This decoction is an uſeful ſoft pectoral; and very agreeable to the palate. It is a good auxiliary in ſharp defluxions on the breaſt and lungs, and has ſometimes done ſervice by itſelf. It may be drank at pleaſure.

337. *Barley-water.* L. E.

Take of pearl-barley, two ounces; water, four pints. Firſt waſh the barley from the mealy matter that adheres to it, with ſome cold water; then boil it a little with about half a pint of freſh water, which will acquire a conſiderable tinge from it. Throw away this tinged water; put the barley into the water preſcribed, made firſt to boil; and continue the boiling till half the water is waſted; then ſtrain.

This liquor is to be drank freely, as a diluter, in fevers and other diſorders. However trivial medicines of this claſs may appear to be, they are of greater importance in the cure of acute diſeaſes, than many more laborious preparations.

338. *Mucilage of quince-ſeeds.* L.

Take of quince-ſeeds, one dram; water, ſix ounces by meaſure. Boil them over a ſoft fire, till the water grows ſlimy almoſt like the white of an egg; then paſs it through a linen cloth.

This is a pleaſant ſoft mucilage, of a ſomewhat ſweetiſh taſte, and a light agreeable ſmell: in theſe reſpects, and in its eaſy ſolubility in water, it differs from the mucilage of gum-tragacanth, to which ſome have ſuppoſed it ſimilar: it has another difference, to its diſadvantage, being apt to grow mouldy in keeping.

[339]—349. *Viper-broth.* L.

Take a middle-ſized viper, freed from the head, ſkin, and inteſtines, and two pints of water. Boil them to a pint and a half; then remove the veſſel from the fire; and when the liquor is grown cold, let the fat, which congeals upon the ſurface if the viper was freſh, be taken off. Into this broth, whilſt warm, put a pullet of a moderate ſize, drawn and freed from the ſkin, and all the fat, but with the fleſh entire. Set the veſſel on the fire again, that the liquor may boil; then remove it from the fire, take out the chicken, and immediately chop its fleſh into little pieces: put theſe into the liquor again, ſet it over the fire, and as ſoon as it boils up, pour out the broth, firſt carefully taking off the ſcum.

Here all the circumſtances ſubſervient to the perfection of the broth are carefully ſet down: and even plain chicken-broth, for the uſe of the ſick, ought to be made in a ſimilar manner.

This ſeems to be one of the beſt preparations of the viper; all the benefit that can be expected from that animal being by this means obtained. It is very nutritious and reſtorative food: continued for a length of time, it has ſometimes done good ſervice in leprous and other obſtinate cutaneous diſeaſes. The dried fleſh of the vipers brought from abroad is not at all ſuperior to the freſh vipers of our own country; the wines and tincture of the animal, probably, have little virtue; the volatile ſalt, however ſtrongly recommended by ſome, does not appear to differ from that producible from every animal-ſubſtance.

350. *Decoction of ſeneka.* E.

Take of ſeneka, rattleſnake root, one ounce; water, a pint and a half. Boil to one pint, and ſtrain.

The virtues of this decoction will be eaſily underſtood from thoſe of the root which it is prepared from. The doſe, in hydropic caſes, and rheumatic or arthritic complaints, is two ounces; to be repeated three or four times a-day, according to its effect.

351. *The common fomentation.* L.

Take of abrotanum leaves dried, ſea-wormwood tops dried, camomile-flowers dried, each one ounce; bay-leaves dried, half an ounce; water, ſix pints. Lightly boil them, and ſtrain out the decoction for uſe.

It is left to the choice of the apothecary to take either the male or female abrotanum, that is, ſouthernwood or lavender-cotton: which, though differing from one another, in ſome reſpect may be looked upon as ſimilar with regard to the purpoſes for which this compoſition is intended: nor indeed can either of them give much aſſiſtance to camomile-flowers and wormwood. The uſe of this decoction is expreſſed in its title: ſpirit of wine, which is commonly added in fomentations, is left to be directed by the preſcriber, in ſuch quantity as particular caſes may require.

352. *The common decoction for glyſters.* L.

Take of mallow-leaves dried, one ounce; camomile flowers dried, ſweet fennel-ſeeds, each half an ounce; water, one pint. Boil them together, and ſtrain out the decoction for uſe.

The title of this decoction ſufficiently expreſſes its uſe, as the baſis of glyſters.

353. *The common decoction.* E.

Take of camomile-flowers, one ounce; carway-ſeeds, half an ounce; water, two quarts. Boil for a quarter of an hour, and then ſtrain out the liquor.

This decoction is intended to anſwer the purpoſes of both the foregoing. It is leſs loaded with ingredients than either, but not perhaps for that reaſon the leſs uſeful.

§ 2. WHEYS.

356. *Muſtard-whey.*

Take milk and water, of each a pint; bruiſed muſtard-ſeed, an ounce and a half. Boil them together till the curd is perfectly ſeparated; afterwards ſtrain the whey through a cloth.

This is the moſt elegant, and by no means the leaſt efficacious method of exhibiting muſtard. It warms and invigorates the habit, and promotes the different ſecretions. Hence, in the low ſtate of nervous fevers, it will often ſupply the place of wine. It is alſo of uſe in the chronic rheumatiſm, palſy, dropſy, &c. The addition of a little ſugar will render it more agreeable. —The doſe is an ordinary tea-cupful four or five times a-day.

537. *Alum-whey.*

Boil two drams of powdered-alum in a pint of milk till it is curdled; then ſtrain out the whey.

This whey is beneficial in an immoderate flow of the menſes, and in a diabetes or exceſſive diſcharge of urine.—The doſe is two, three, or four ounces, according as the ſtomach will bear it, three times a-day. If it ſhould occaſion vomiting, it may be diluted.

583. *Scorbutic whey.*

This whey is made by boiling half a pint of the ſcorbutic juices in a quart of cow's milk. More benefit, however, is to be expected from eating the plants than from their expreſſed juices.

The ſcorbutic-plants are, bitter-oranges, brooklime, garden ſcurvy-graſs, and water-creſſes.

§ 3. VINEGARS.

359. VINEGAR extracts the virtues of ſeveral medicinal ſubſtances in tolerable perfection: but at the ſame time its acidity makes a notable alteration in them, or ſuperadds a virtue of a different kind; and hence it is more rarely employed in this intention than purely aqueous or ſpirituous menſtrua. Some drugs, however, vinegar, for particular purpoſes, excellently aſſiſts or coincides with, as ſquills, garlic, ammoniacum, and others: and in many caſes, where this acid is itſelf principally depended on, it may be advantageouſly impregnated with the flavour of certain vegetables; moſt of the odoriferous flowers impart to it their fragrance, together with a fine purpliſh or red colour. Violets, for inſtance, if freſh parcels of them are infuſed in vinegar in the cold for a little time, communicate to the liquor a pleaſant flavour, and deep purpliſh red colour. Vinegar, like other acids, added to watery infuſions or decoctions, generally precipitates a part of what the water had diſſolved.

360. *Vinegar of ſquills.*

Take of dried ſquills, one pound; vinegar, ſix pints. Macerate the ſquills in the vinegar with a gentle heat; then preſs out the liquor, and ſet it by till the fæces have ſubſided: the vinegar being afterwards poured off, add to it about one-twelfth its quantity of proof-ſpirit, that it may keep the longer from growing mothery. *L.*

Take of the dried root of ſquills, four ounces; diſtilled vinegar, two pints; proof-ſpirit, two ounces. Macerate the root with the vinegar for eight days; then add the ſpirit; and when the fæces have ſubſided, pour off the clear liquor. *E.*

This is a medicine of great antiquity: we find, in a treatiſe attributed to Galen, an account of its preparation, and of many particular virtues then aſcribed to it. It is a very powerful ſtimulant, aperient, and attenuant of tenacious juices; and hence is frequently uſed with good ſucceſs in diſorders of the breaſt occaſioned by a load of thick viſcid phlegm, for promoting urine in hydropic caſes, &c. The doſe of this medicine is from a dram to half an ounce. Where crudities abound in the firſt paſſages, it may be given at firſt in a larger doſe, to evacuate them by vomit. It is moſt conveniently exhibited along with cinnamon or other agreeable aromatic waters, which prevent the nauſea it would otherwiſe, even in ſmall doſes, be apt to occaſion.

§ 4. WINES.

361. THE original intention of medicated wines was, that medicines, which were to be continued for a length of time, might be taken in the moſt familiar and agreeable form; by this means a courſe of remedies was complied with, notwithſtanding the repugnance and averſion which the ſick often manifeſt to thoſe directly furniſhed from the ſhops; and hence the inferior ſort of people had their medicated ales. Nevertheleſs, as vinous liquors excellently extract the virtues of ſeveral ſimples, and are not ill fitted for keeping, they have been employed as officinal menſtrua alſo; and ſubſtances of the greateſt efficacy are truſted in this form. As compounds of water and inflammable ſpirit, they take up ſuch parts of vegetables and animals as are ſoluble in thoſe liquors; though moſt of them abound at the ſame time with a mucilaginous or viſcous ſubſtance, which renders them leſs effectual menſtrua than purer mixtures of water and ſpirit. They contain likewiſe a ſubtle acid, which ſomewhat further obſtructs their action on certain vegetable and animal matters, but enables them, in proportion to its quantity, to diſſolve ſome bodies of the metallic kind, and thus impregnate themſelves with the corroborating virtues of ſteel, the alterative and emetic powers of antimony, and the noxious qualities of lead.

Note, To all the medicated wines, after they have been ſtrained, you may add about one-twentieth their quantity of proof-ſpirit to preſerve them from fermentation. They may be conveniently kept in the ſame kind of glaſs-bottles that wines generally are for common uſes, which ſhould likewiſe be corked with the ſame care. *L.*

362—364. *Alkaline aloetic wine.* L.

Take of any fixed alkaline ſalt, eight ounces; ſocotorine aloes, ſaffron, myrrh, each one ounce; ſal ammoniac purified, ſix drams; mountain wine, two pints. Macerate without heat for a week or longer; then filter the wine through paper.

This is the *elexir proprietatis Helmontii*, with ſome little variations which affect the compounder rather than the compoſition.

Helmont and others have entertained a very high opinion of this medicine, and looked upon it as "a vivifying and preſerving balſam, capable of continuing health and prolonging life to the utmoſt poſſible limits." The medicine is doubtleſs a very efficacious and uſeful one for many purpoſes: it may be ſo managed as to attenuate viſcid juices and open obſtructions in the remoter parts, and promote evacuation by almoſt all the emunctories. In doſes of one, two, or three drams, it increaſes the urinary ſecretion; and if the patient is kept moderately warm, generally proves diaphoretic or ſudorific; in larger doſes, it gently looſens the belly.

365, a. *Bitter wine.* L.

Take of gentian root, yellow rind of lemon-peel, freſh, each one ounce; long pepper, two drams; mountain wine, two pints. Macerate without heat, and ſtrain out the wine for uſe.

This is a very elegant bitter, which the addition of the long pepper renders conſiderably warmer than the watery infuſion. Gentian and lemon-peel, as we have already ſeen, make a bitter of a very grateful flavour. "The ſpice here added was ſelected after the trial of many other materials."

365, b. *Bitter wine.* E.

Take of gentian root, half an ounce; Peruvian bark, one ounce; dried orange-peel, two drams; canella alba, one dram; proof-ſpirit, four ounces; white-wine, two pints. Firſt pour on the proof-ſpirit, then the wine; macerate four days, and ſtrain.

This wine ſupplies the place of the ſtomachic tincture of the former pharmacopœia.

366. *Antimonial or emetic wine.*

Take of crocus of antimony, waſhed, one ounce; mountain wine, a pint and a half. Digeſt without heat, and filter the wine through paper. *L.*

Take of glaſs of antimony, levigated, one ounce; white wine, one pint. Digeſt for three days, ſhaking the mixture now and then, and filter the liquor through paper. *E.*

The antimonial wine poſſeſſes the whole virtues of that mineral, and may be ſo doſed and managed as to perform all that can be effected by any antimonial preparation; with this advantage, that as the active part of the antimony is here already diſſolved and rendered miſcible with the animal-fluids, its operation is more certain. Given from 10 to 50 or 60 drops, it acts generally as an alterative and diaphoretic; in larger doſes, as a diuretic and cathartic; whilſt three or four drams prove for the moſt part violently emetic. It has been chiefly uſed in this laſt intention, in ſome maniacal and apoplectic caſes; and hence gained the name of *emetic wine*.

367. *Steel-wine.*

Take of iron filings, four ounces; cinnamon, mace, each half an ounce; Rheniſh wine, four pints. Macerate without heat for a month, frequently ſhaking the veſſel; then ſtrain off the wine for uſe. *L.*

Take of iron-filings, three ounces; cochineal, half a dram; Rheniſh wine, two pints. Digeſt them together for twenty days, frequently ſhaking the veſſel; and then paſs the wine through a filter. *E.*

Both theſe wines are ſufficiently elegant ones. Rheniſh is an excellent menſtruum for ſteel, and diſſolves a conſiderable quantity of it: the cochineal, in the ſecond, imparts a fine colour; and the ſpices, in the firſt, give the liquor an agreeable flavour, make it ſit eaſier on the ſtomach, and likewiſe promote its medicinal efficacy.

368. Steel-wine is a very uſeful preparation of this metal, and frequently exhibited in chlorotic and other indiſpoſitions where chalybeates are proper. Boerhaave recommends it as one of the nobleſt medicines he was acquainted with, for promoting that power in the body by which blood is made, when weakened by a bare debility of the over-relaxed ſolids, and an indolent, cold, aqueous indiſpoſition of the juices; for in this caſe, ſays he, no virtue of any vegetable or animal ſubſtance, no diet or regimen can effect that, which is effected by iron; but it proves hurtful where the vital powers are already too ſtrong, whether this proceeds

ceeds from the fluids or the ſolids. The doſe is from a dram to half an ounce; which may be repeated two or three times a-day.

369. *Saffron-wine.* L.

Take of ſaffron, one ounce; canary, one pint. Macerate without heat, and ſtrain off the wine.

Canary has been objected to by ſome as an improper menſtruum for medicinal ſimples, ſince it contains a large quantity of unctuous matter, which impedes its diſſolving power: a pint of this ſort of wine left, upon evaporation, two ounces of a mellaginous ſubſtance, not unlike honey boiled hard. It is nevertheleſs, for ſaffron, a very well adapted menſtruum, as not only ſufficiently loading itſelf with its virtues, but likewiſe coinciding in the general intention of the medicine, that of a cordial. The preparation made with Canary is alſo better fitted for keeping than when wines that have any tendency to acidity are employed; for tinctures of ſaffron drawn with theſe laſt ſoon loſe their fine colour; whilſt thoſe made with the firſt retain it for a much longer time. The doſe of this tincture is from one dram to three or more.

370. *Wine of ipecacoanha.* L.

Take of ipecacoanha, two ounces; yellow rind of Seville orange-peel, dried, half an ounce; Canary, two pints. Macerate without heat, and ſtrain out the wine.

371. *Tincture of ipecacuanha.* E.

Take of ipecacuanha in powder, one ounce; mountain wine, one pint. After three days digeſtion, let the tincture be filtered for uſe.

Both theſe wines are very mild and ſafe emetics, and equally ſerviceable in dyſenteries alſo, with the ipecacuanha in ſubſtance; this root yielding nearly all its virtues both to the mountain and Canary wines here ordered, as it does a good ſhare of them even to aqueous liquors. The common doſe is an ounce, more or leſs, according to the age and ſtrength of the patient.

372. *Viper-wine.* L.

Take of dry vipers, two ounces; mountain, three pints. Macerate with a gentle heat for a week; and then ſtrain off the wine.

It has been diſputed, whether live or dry vipers are preferable for making this medicine: ſuch as are moderately and newly dried, are perhaps the moſt eligible, ſince, by exſiccation, they ſeem to loſe only their phlegmatic or aqueous parts. Whether they communicate to the wine, either when uſed freſh or dry, ſo much virtue as they are ſuppoſed to do, is greatly to be doubted. Some compoſitions under this name have been highly celebrated, as reſtoratives, in debilities and decays of conſtitution; but what virtues of this kind they poſſeſſed, were ſupplied chiefly from other ingredients.

373. *Wine of millepedes.* E.

Take of live millepedes, bruiſed, two ounces; Rheniſh wine, one pint. Pour the wine on the millepedes bruiſed a little; infuſe for twelve hours, and ſtrain off the liquor, and ſqueeze it out from the reſiduum.

This wine has been commended as an admirable cleanſer of all the viſcera, yielding to nothing in the jaundice and obſtructions of the kidneys or urinary paſſages, of excellent ſervice in almoſt all chronical diſtempers, even in ſcrophulous and ſtrumous ſwellings, and in defluxions of rheum upon the eyes. But thoſe who expected theſe extraordinary virtues from it, have often been deceived; and at preſent there are few who have any great dependence on it. It is directed to be given from half an ounce to two ounces.

374. *Cephalic tincture.* E.

Take of wild valerian root, four ounces; Virginian ſnakeroot, one ounce; roſemary tops, half an ounce; French white-wine, ſix pints. Digeſt them together for three days, and then filter the tincture.

This preparation promiſes to be a medicine of conſiderable utility as a cephalic, that is, in diſorders of the nervous ſyſtem, wherein the membranes of the brain are often principally affected, as in vertiginous, epileptic, and paralytic complaints.

375. *Vinous tincture of rhubarb.* L.

Take of rhubarb, two ounces; leſſer cardamom ſeeds, freed from the huſks, half an ounce; ſaffron, two drams; mountain wine, two pints. Macerate without heat, and then ſtrain off the tincture.

This is a warm, cordial, laxative medicine. It is uſed chiefly in weakneſs of the ſtomach and bowels, and ſome kinds of looſeneſſes, for evacuating the offending matter, and ſtrengthening the tone of the viſcera. It may be given from half a ſpoonful to three or four ſpoonfuls or more, according to the circumſtances of the diſorder, and the purpoſes it is intended to anſwer.

376. *Tinctura ſacra.*

Take of ſocotorine aloes, eight ounces; canella alba, two ounces; mountain wine, ten pints. Reduce the aloes and canella ſeparately into powder; then mix, and pour on them the wine; afterwards macerate without heat, for a week or longer, occaſionally ſhaking the veſſel; laſtly, ſtrain off the wine. It will be convenient to mix with the powders ſome white ſand, well waſhed from dirt, to prevent the aloes from concreting, which it is apt to do upon being moiſtened. *L.*

Take of ſocotorine aloes in powder, one ounce; Ginger, Jamaica pepper, each one dram; mountain wine, a pint and a half. Digeſt for ſeven days, ſhaking the mixture now and then, and then ſtrain off the tincture. *E.*

This medicine has long been in great eſteem, not only as a cathartic, but likewiſe as a ſtimulus; the wine diſſolving all that part of the aloes in which theſe qualities reſide, a portion only of the leſs active reſinous matter being left. The aromatic ingredients are added to warm the medicine, and ſomewhat alleviate the ill flavour of the aloes: canella alba, or cloves, are ſaid, among numerous materials that have been made trial of, to anſwer this end the moſt ſucceſsfully.

The tinctura ſacra appears from long experience, to be a medicine of excellent ſervice in languid, phlegmatic habits, not only for cleanſing the primæ viæ, but likewiſe for attenuating and diſſolving viſcid juices in the remoter parts, for ſtimulating the ſolids, warming the habit, promoting or exciting the uterine purgations, and the hæmorrhoidal flux. The doſe, as a purgative, is from one to two ounces, or more: it may be introduced into the habit, ſo as to be productive of excellent effects as an alterant, by giving it in ſmall doſes at proper intervals: thus managed, it does not for a conſiderable time operate remarkably by ſtool; but at length proves purgative, and occaſions a lax habit of much longer continuance than that produced by the other common cathartics.

377. *Thebaic tincture.* L. [See n° 418.]

Take of ſtrained opium, two ounces; cinnamon, cloves, each one dram; mountain wine, one pint. Macerate without heat for a week, and then filter the tincture through paper.

This is the liquid laudanum of Sydenham, with the exchange of Canary wine for mountain, and the omiſſion of an ounce of ſaffron. The aromatics in the form above are in ſo ſmall quantity, that the preſcriber can ſcarce expect any conſiderable effect from them, the proportion of each that goes to a grain of opium, amounting to no more than the ſixteenth part of a grain: even theſe minute proportions, however, are in good meaſure ſufficient to take off the ill odour of the opium; which ſeems to be all that is intended by them.

378, 379. The principal advantages of exhibiting opium in this form are, that by being already diſſolved, it exerts itſelf the ſooner in the body; and that by ſome perſons, liquids are more commodiouſly taken, than a bolus or pill. The common doſes of the tincture are from ten drops to forty, fifty, or more, according to the exigences of the caſe. It were to be wiſhed, that the doſe could be more exactly aſcertained, by weight or meaſure: as the drops may, according to different circumſtances, vary in quantity, though in number the ſame; and as an error therein may, in ſome caſes, be of miſchievous conſequences. Twenty drops contain at a medium about one grain of opium, or rather ſo much as that quantity of wine will extract from one grain; for the liquor does not diſſolve the whole ſubſtance of the opium, nor is the ſolution equivalent in its effect to the full quantity of opium employed in it.

A liquid opiate, free from the inconveniencies here complained of, will be deſcribed under the the head of ſpirituous tinctures.

380. *White dittany wine.* E.

Take of white dittany root, one ounce; iron filings free from ruſt, three drams; white wine, one pint. Digeſt 25 hours, and then ſtrain of the liquor.

§ 5. Ales.

381. There are two ways of impregnating malt-liquors with the virtues of medicinal ſubſtances: Macerating the ſubject in the liquor after the fermentation is completely finiſhed; and fermenting it along with the liquor, or at leaſt adding it towards the end of the fermentation, that, by the reſolutive power of that proceſs, its texture may be opened, and its medicinal parts more fully extracted. Neumann obſerves, that the active powers of many vegetables are not only effectually extracted, but extended, as it were, by fermentation: that ſo much pounded nutmeg as will lie on the point of a knife, gives a flavour to a large vat of fermenting ale; whereas, when the fermentation is finiſhed, the quantity of liquor to which it gives a like impregnation, is comparatively inconſiderable.

As the medicinal ales are chiefly intended for diet-drinks, it is not neceſſary to be very exact with regard to their doſes. In general, they may be taken to a pint or more in the day, and continued as long as neceſſary. They ſhould not, however, be long uſed at a time, as all bitters are apt to affect the head when their uſe is perſiſted in.

382. *Antiſcorbutic ale.*

Take of horſe-radiſh root, freſh, one pound; great water-dock root, ſliced and dried, two pounds; water-trefoil, dried, four ounces. Infuſe them in ten gallons of new ale.

In ſcorbutic diſorders, this ale, uſed as common drink, generally does ſervice.

383. *Bitter ale.*

Take of gentian root, four ounces; lemon peel, three ounces; canella alba, two ounces; ale, two gallons. Let the ingredients be cut ſmall, and ſteeped in the ale without heat.

This is an agreeable ſtomachic ale, ſuperior to the common purls and moſt other preparations of that kind.

384. *Diuretic ale.*

Take of muſtard-ſeed and juniper-berries, each eight ounces; ſeeds of the wild carrot, ſix ounces; new ſmall ale, ten gallons.

In gravelly complaints, and dropſical habits, this is an uſeful diet-drink.

385. *Opening ale.*

Take of ſena, four ounces; tops of leſſer centaury, and wormwood, each three ounces; of ſocotorine aloes, half an ounce. Infuſe in ten gallons of ale.

Half a pint of this ale may be taken twice a-day, or oftener if neceſſary, to keep the body open.

386. *Dr Butler's ale.*

Take of betony, ſage, agrimony, garden ſcurvy-graſs, Roman wormwood, each three handfulls; elecampane roots, each four ounces; new ale, four gallons. The herbs and roots are to be put in a bag, and hung in the ale while it works.

This liquor has ſo far obtained among the common people, as to have been frequently made and ſold in public houſes. It is uſed in the ſpring, for purifying the blood, and preventing ſcorbutic diſorders.

387. *Cephalic ale.*

Take of wild valerian root, ten ounces; muſtard ſeed, whole, ſix ounces; Virginian ſnakeroot, two ounces; roſemary, or ſage, three ounces; new ſmall ale, ten gallons.

The ingredients of this compoſition are all of the warm and ſtimulating kind; and conſequently tend to invigorate the nervous ſyſtem, and promote the circulation of the fluids. In palſies, epilepſies, and vertigoes, ſome benefit may be expected from this liquor uſed as common drink.

§ 6. SPIRITUOUS TINCTURES.

388. RECTIFIED ſpirit of wine is the direct menſtruum of the reſins and eſſential oils of vegetables; and totally extracts theſe active principles from ſundry vegetable matters, which yield them to water either not at all, or only in part. It diſſolves likewiſe the ſweet ſaccharine matter of vegetables; and generally thoſe parts of animal-bodies in which their peculiar ſmells and taſtes reſide.

389. The virtues of many vegetables are extracted almoſt equally by water and rectified ſpirit; but in the watery and ſpirituous tinctures of them there is this difference, that the active parts in the watery extractions are blended with a large proportion of inert gummy matter, on which their ſolubility in this menſtruum in great meaſure depends, while rectified ſpirit extracts them almoſt pure from gum. Hence, when the ſpirituous tinctures are mixed with watery liquors, a part of what the ſpirit had taken up from the ſubject generally ſeparates and ſubſides, on account of its having been freed from that matter which, being blended with it in the original vegetable, made it ſoluble in water. This, however, is not univerſal; for the active parts of ſome vegetables, when extracted by rectified ſpirit, are not precipitated by water, being almoſt equally diſſoluble in both menſtrua.

390. Rectified ſpirit may be tinged by vegetables of all colours, except blue: the leaves of plants in general, which give out but little of their natural colour to watery liquors, communicate to ſpirit the whole of their green tincture, which for the moſt part proves elegant, though not very durable.

Fixed alkaline ſalts deepen the colour of ſpirituous tinctures; and hence have been ſuppoſed to promote the diſſolving power of the menſtruum, tho' this does not appear from experience: in the trials that have been made to determine this affair, no more was found to be taken up in the deep-coloured tinctures than in the paler ones, and often not ſo much: if the alkali be added after the extraction of the tincture, it will heighten the colour as much as when mixed with the ingredients at firſt. Nor is the addition of theſe ſalts in making tinctures uſeleſs only, but likewiſe prejudicial, as they in general injure the flavour of aromatics, and ſuperadd a quality ſometimes contrary to the intention of the medicine.—Volatile alkaline ſalts, in many caſes, promote the action of the ſpirit. Acids generally weaken it, unleſs when the acid has been previouſly combined with the vinous ſpirit into a compound of new qualities, called *dulcified ſpirit*.

391. *General rules for extracting tinctures.*

I. The vegetable ſubſtances ought to be moderately and newly dried, unleſs they are expreſsly ordered otherwiſe. They ſhould likewiſe be cut and bruiſed before the menſtruum is poured on them.

II. If the digeſtion is performed in balneo, the whole ſucceſs depends upon the proper management of the fire: it ought to be all along gentle, unleſs the hard texture of the ſubject ſhould require it to be augmented; in which caſe the heat may be increaſed, ſo as to make the menſtruum boil a little towards the end of the proceſs.

III. Very large circulatory veſſels ought to be employed for this purpoſe, which ſhould be heated before they are luted together.

Circulatory veſſels are thoſe which are ſo contrived, and of ſuch a height, that the vapour which ariſes during the digeſtion may be cooled and condenſed in the upper part, and fall down again into the liquor below: by this means the diſſipation both of the ſpirit and of the volatile parts of the ingredients is prevented. They are generally compoſed of two long-necked matraſſes or bolt-heads; the mouth of one of which is to be inſerted into that of the other, and the juncture ſecured by a piece of wet bladder. The uſe of heating the veſſels is, to expel a part of the air; which otherwiſe, rarefying in the proceſs, would endanger burſting them or blowing off the uppermoſt matraſs. A ſingle matraſs with a long neck, or with a glaſs-pipe inſerted into its mouth, is more commodious than the double veſſel. See 182.

IV. The veſſel is to be frequently ſhaken during the digeſtion.

V. All tinctures ſhould be ſuffered to ſettle before they are committed either to the filter or ſtrainer.

VI. In the tinctures (and diſtilled ſpirits likewiſe) deſigned for internal uſe, no other ſpirit (drawn from malt, melaſſes, or other fermented matter) is to be uſed than that expreſsly preſcribed.

VII. Reſin and reſinous gums yield tinctures more ſucceſsfully, if, after being ground into powder, they be mixed with ſome white ſand well waſhed and dried, which will prevent their running into lumps by the heat. If the powders preſcribed are ſufficient for this purpoſe, ſuch an addition is unneceſſary.

392. *Bitter tincture.* L.

Take of gentian root, two ounces; yellow rind of Seville orange-peel, dried, one ounce; leſſer cardomom-ſeeds, freed from the huſks, half an ounce; proof-ſpirit, two pints. Digeſt without heat, and ſtrain off the tincture.

393. *Bitter tincture, or ſtomachic elixir.* E.

Take of gentian root, two ounces; dried orange-peel, an ounce; canella alba, half an ounce; cochineal, half a dram; French brandy, two pints. Let them ſteep for four days, and then filter the elixir.

Both this and the preceding compoſition are very uſeful ſtomachic bitters.

394. *Tincture of wormwood.* E.

Take of the dried tops of wormwood in flower, four ounces; rectified ſpirit of wine, two pints. Macerate for two days; and ſtrain the liquor, preſſing it out from the reſiduum; then pour it upon other two ounces of wormwood; macerate again for four days, and preſs through a linen-cloth; and laſtly, filter the liquor.

395. *Aromatic tincture.*

Take of cinnamon, ſix drams; leſſer cardomom-ſeeds, freed from the huſks, three drams; long-pepper, ginger, each two drams; proof-ſpirit, two pints. Digeſt without heat, and then ſtrain off the tincture. L.

Take of cinnamon, ſix drams; leſſer cardomom-ſeeds, an ounce; angelica ſeeds, three drams; long-pepper, two drams; proof-ſpirit, two pints. Macerate for ſeven days; and then filtre. E.

This is a very warm aromatic, too much ſo to be given without dilution. A teaſpoonful or two may be taken in wine, or any other convenient vehicle, in languors, weakneſs of the ſtomach, flatulencies, and other like complaints. The *ſtomachic tincture*, deſcribed hereafter, is ſimilar in intention to this; but contrived leſs hot of the ſpices, that it may be taken by itſelf.

396. *Balſamic tincture.*

Take of balſam of copaiba, one ounce and a half; balſam of Peru, half an ounce; Engliſh ſaffron, one dram; rectified ſpirit of wine, one pint. Digeſt theſe ingredients together, in a ſand-heat, for three days; and then paſs the tincture through a ſtrainer.

This tincture is an excellent balſamic, both for internal and external purpoſes. It is uſually given, in doſes of 10, 20, or 30 drops, in the fluor albus, gleets, cachexies, ſome kinds of aſthmas and nephritic complaints, for ſtrengthening the tone of the viſcera, and corroborating the nervous ſyſtem in general. Some caution is requiſite in the uſe of theſe reſinous warm medicines: in cold, languid, phlegmatic habits, they have for the moſt part good effects; but in bilious and plethoric conſtitutions, where there is any tendency to inflammation or immoderate heat, they are manifeſtly prejudicial, and raiſe or continue febrile ſymptoms.

397. *Tincture of cantharides.*

Take of cantharides, bruiſed, two drams; cochineal, half a dram; proof-ſpirit, a pint and a half. Digeſt them together; and afterwards filter the tincture through paper. L.

Take of cantharides, two drams; rectified ſpirit of wine, a pint and a half. Digeſt for four days, and then filter the tincture. E.

Theſe tinctures poſſeſs the whole virtues of the fly, and are the only preparations of it deſigned for internal uſe; tinctures being by far the moſt commodious and ſafe form for the exhibition of this active drug. The uſual doſe of theſe tinctures is from 10 to 20 drops, which may be taken in a glaſs of water, or any other more agreeable liquor, twice a-day, and increaſed by two or three drops at a time, according to the effect.

398. *Tincture of cardomoms.*

Take of leſſer cardomom-ſeeds, huſked, half a pound; proof-ſpirit, two pints. Digeſt without heat, and ſtrain the tincture. L.

Take of leſſer cardomom-ſeeds, ſix ounces; proof-ſpirit, two pints. Macerate for eight days; and then filter. E.

Tincture of cardamoms has been in uſe for a conſiderable time, though but lately received into the diſpenſatory. It is a pleaſant, warm cordial, and may be taken, along with any proper vehicle, from a dram to a ſpoonful or two.

398. *Tincture of caſtor.*

Take of Ruſſia caſtor, powdered, two ounces; proof-ſpirit, two pints. Digeſt for ten days without heat, and ſtrain off the tincture. L.

Take of Ruſſia caſtor, an ounce and a half; rectified ſpirit of wine, one pint. Digeſt them for ſix days, and afterwards ſtrain out the liquor. E.

400. *Compound tincture of caſtor.* E.

Take of Ruſſia caſtor, one ounce; aſafetida, half an ounce; vinous ſpirit of ſal ammoniac, one pint. Digeſt for ſix days in a cloſe-ſtopped phial, and then ſtrain the tincture.

This compoſition is a medicine of real efficacy, particularly in hyſterical diſorders, and the ſeveral ſymptoms which accompany them. The vinous ſpirit of ſal ammoniac, now uſed inſtead of the volatile oily ſpirit preſcribed, is an excellent menſtruum both for the caſtor and the aſafetida, and greatly adds to their virtues.

401, a. *Tincture of cinnamon.* L. E.

Take of cinnamon, an ounce and a half; proof-ſpirit, a pint. Digeſt without heat, and ſtrain off the tincture.

The tincture of cinnamon poſſeſſes the reſtringent virtues of the cinnamon, as well as its aromatic cordial ones; and in this reſpect it differs from the diſtilled waters of the ſpice.

401, b. *Volatile tincture of guaiacum.* L.

Take of gum guiacum, four ounces; volatile aromatic ſpirit, a pint and a half. Digeſt, without heat, in a veſſel cloſe ſtopped; and afterwards let the tincture be paſſed through a ſtrainer.

This is a very elegant and efficacious tincture; the volatile ſpirit excellently diſſolving the gum, and at the ſame time promoting its medicinal virtue. In rheumatic caſes, a tea-ſpoonful, taken every morning and evening in any convenient vehicle, has proved of ſingular ſervice.

402. *Simple tincture of Peruvian bark.* L. E.

Take of Peruvian bark, four ounces; proof-ſpirit, two pints. Digeſt and ſtrain.

A medicine of this kind has been for a long time pretty much in eſteem, and uſually kept in the ſhops, though but lately received into the diſpenſatory.

For general uſe, this is the moſt convenient of the bark-tinctures, the proof-ſpirit extracting nearly all the virtues of the bark. It may be given from a teaſpoonful to half an ounce, or an ounce, according to the different purpoſes it is intended to anſwer.

403. *Volatile tincture of Peruvian bark.* L.

Take of Peruvian bark, four ounces; ſpirit of ſal ammoniac, two pints. Digeſt without heat in a veſſel cloſe ſtopped; and afterwards ſtrain the tincture.

This tincture is but lightly impregnated with the virtues of the bark; and is ſo acrimonious, that the largeſt doſe which can with ſafety be given of it, can contain only a very ſmall quantity of the ſubject. The medicine nevertheleſs has its uſes, and may be ſerviceable in ſome caſes where the ſtronger are improper, as in difficulty of breathing, obſtructions, and oppreſſions of the breaſt. Stronger tinctures of this kind may be obtained by means of dulcified ſpirit of ſal ammoniac, or the ſpirit prepared with quicklime. All the three may be employed where a large quantity of bark is not required, as at the cloſe of the cure of intermittents; in weakneſs of digeſtion, attended with a cold ſenſation at the ſtomach; and ſome fluxes, particularly thoſe from the uterus, where the circulation is languid, the fibres relaxed, and where there is a periodical return of ſlight feveriſh complaints. In theſe caſes, Dr Lewis ſays he has often experienced ſalutary effects from a tincture in dulcified ſpirit of ſal ammoniac, given to the quantity of a teaſpoonful five or ſix times a-day, in any appropriated vehicle.

404. *Compound tincture of Peruvian bark.* E.

Take of Peruvian bark, in powder, three ounces; Virginian ſnakeroot, gentian, each two drams; French brandy, two pints. Let them ſteep together for three days, and afterwards filter the tincture.

The ſubſtances here joined to the bark, in many caſes, promote its efficacy in the cure of intermittents; and not unfrequently, are abſolutely neceſſary. In ſome ill habits, particularly where the juices are ſluggiſh and tenacious, the viſcera and abdominal glands obſtructed, the bark by itſelf proves unſucceſsful, if not injurious; whilſt given in conjunction with corroborant ſtomachics and deobſtruents, it rarely fails of the due effect. Gentian and Virginian ſnakeroot, are among the beſt additions for this purpoſe; to which it is often neceſſary to join chalybeat medicines alſo.

405. *Tincture of ſaffron.* E.

Take of Engliſh ſaffron, one ounce; French brandy, one pint. After digeſting them for five days, let the tincture be filtered out for uſe.

This tincture is ſimilar in virtue to the ſaffron-wine, n° 368. A ſpirituous menſtruum is here preferred to the wine, as a tincture drawn with the former retains its elegant colour longer, and is not apt to depoſit in keeping any part of what it had taken up from the ſaffron.

406. *Tincture or eſſence of white dittany.* E.

Take of freſh dittany root, two ounces; rectified ſpirit of wine, 14 ounces. Digeſt for eight days, and filter.

407. *Fetid tincture.* E.

Take of aſafetida, two ounces; vinous ſpirit of ſal ammoniac, one pint. Macerate for ſix days in a cloſe-ſtopped phial, and ſtrain.

This tincture poſſeſſes the virtues of the aſafetida itſelf, and may be given from 10 drops to 50 or 60.

408. *Tincture of ſoot.*

Take of wood-ſoot, two ounces; aſafetida, one ounce; proof-ſpirit, two pints. Digeſt and ſtrain. *L.*

Take of ſhining wood ſoot, one ounce; aſafetida, half an ounce; French brandy, a pint. Digeſt for ſix days, and ſtrain. *E.*

Theſe medicines are found ſerviceable, not only in hyſteric caſes, but likewiſe in other nervous diſorders. They may be given from a tea ſpoonful to a common ſpoonful twice a day.

409. *Tincture of jalap.*

Take of jalap-root, eight ounces; proof-ſpirit, two pints. After proper digeſtion, ſtrain off the tincture. L.

Take of jalap, in coarſe powder, three ounces; French brandy, one pint. Digeſt them for eight days, and ſtrain the tincture. E.

This tincture is an uſeful and mild purgative, the menſtruum here employed taking up ſo much of the gummy parts as corrects the griping quality which the reſin is attended with. It may be taken by itſelf from a dram to half an ounce; or mixed in ſmaller quantity with cathartic infuſions, or the like.

410. a, *Tincture of Kino.*

Take of gum kino, two ounces; proof-ſpirit, one pint. Digeſt for eight days, and ſtrain.

410. b, *Japonic tincture.* L. E.

Take of Japan earth, three ounces; cinnamon, two ounces; proof-ſpirit, two pints. After proper digeſtion, let the tincture be paſſed through a ſtrainer.

This tincture is of good ſervice in all kinds of defluxions, catarrhs, looſeneſſes, uterine fluors, and other like diſorders, where mild aſtringent medicines are indicated. Two or three teaſpoonfuls may be taken every now and then, in red wine, or any other proper vehicle.

411. *Tincture of gum-lac.* E.

Take of gum-lac, powdered, an ounce; Myrrh, powdered, half an ounce; ſpirit of ſcurvygraſs, a pint and a half. Digeſt in a ſand-heat for ſix days; after which ſtrain off the tincture for uſe.

This tincture is principally employed for ſtrengthening the gums, and in bleedings and ſcorbutic exulcerations of them: it may be fitted for uſe in theſe intentions, by mixing it with honey of roſes, or the like. Some recommend it internally againſt ſcorbutic complaints, and as a corroborant in gleets, female weakneſſes, &c. Its warmth, pungency, and manifeſtly aſtringent bitteriſh taſte, point out its virtues, in theſe caſes, to be conſiderable; though common practice among us has not yet received it.

412. *Tincture of the martial flowers.* L.

Take of martial flowers, four ounces; proof-ſpirit, one pint. Digeſt and ſtrain.

413. a, *Tincture of iron.* E.

Take of the ſcales of iron, prepared and reduced to powder, three ounces; muriatic acid, as much as is ſufficient for diſſolving the powder. Digeſt with a great heat; and when the iron is totally diſſolved, add as much ſpirit of wine as will make the whole two pounds by meaſure.

413. b, *Tincture of iron in ſpirit of ſalt.* L.

Take of iron filings, half a pound; Glauber's ſpirit of ſalt, three pounds; rectified ſpirit of wine, three pints. Digeſt the iron filings in the ſpirit of ſalt, without heat, as long as the ſpirit acts upon the iron; after the fæces have ſubſided, evaporate the liquor to one pound, and add thereto the vinous ſpirit.

All theſe tinctures are greatly preferable to the calces or croci of iron, as being not only more ſpeedy, but likewiſe more certain, in their operation: the latter, in ſome caſes, paſs off through the inteſtinal tube with little effect; whilſt the tinctures ſcarce ever fail. From 10 to 20 drops of either of the tinctures, may be taken two or three times a-day, in any proper vehicle; though it is ſeldom adviſeable to extend the doſe ſo far as the laſt of theſe quantities, eſpecially in regard to the tincture in the ſpirit of ſalt, which is exceeding ſtrong of the iron.

414. *Tincture of meconium.* E.

Take of opium, two drams; ſimple Jamaica pepper-water, 20 ounces by weight; rectified ſpirit of wine, 10 ounces by weight. Having rubbed the opium well with the water, add the ſpirit, digeſt for eight days, and then filter through paper.

415. *Tincture of melampodium, or black hellebore.* L. E.

Take of black hellebore roots, four ounces; cochineal, two ſcruples; proof-ſpirit, two pints. Digeſt them together, and afterwards filter the tincture through paper.—The Edinburgh college orders only half a dram of cochineal, and deſires the digeſtion to be continued for eight days.

This is perhaps the beſt preparation of hellebore when deſigned for an alterative, the menſtruum here employed extracting the whole of its virtues. It has been found, from experience, particularly ſerviceable in uterine obſtructions; in ſanguine conſtitutions, where chalybeates are hurtful, it ſeldom fails of exciting the menſtrual evacuations, and removing the ill conſequences of their ſuppreſſion. So great is the power of this medicine, that wherever, from an ill conformation of the parts, or other cauſes, the expected diſcharge does not ſucceed upon the uſe of it, the blood, as Dr Mead has obſerved, is ſo forcibly propelled, as to make its way through other paſſages. A tea-ſpoonful of the tincture may be taken twice in a day in warm water, or any other convenient vehicle.

416. *Tincture of muſk.* L.

Take of muſk, two drams; rectified ſpirit of wine, one pint. Digeſt for ten days, and ſtrain.

417. *Tincture of myrrh.*

Take of myrrh, three ounces; proof ſpirit, two pints. After due digeſtion, ſtrain off the tincture. *L.*

Take of myrrh in powder, an ounce and a half; rectified ſpirit of wine, a pint. Digeſt for ten days; then ſtrain off the tincture for uſe. *E.*

Tincture of myrrh is recommended internally for warming the habit, attenuating viſcid juices, ſtrengthening the ſolids, opening obſtructions, particularly thoſe of the uterine veſſels, and reſiſting putrefaction. Boerhaave greatly eſteems it in all languid caſes proceeding from ſimple inactivity; in thoſe female diſorders which are occaſioned by an aqueous, mucous, ſluggiſh indiſpoſition of the humours, and a relaxation of the veſſels; in the fluor albus, and all diſeaſes ariſing from a like cauſe. The doſe is from 15 drops to 40 or more. The medicine may doubtleſs be given in theſe caſes to advantage; tho' with us it is more commonly uſed externally, for cleanſing foul ulcers, and promoting the exfoliation of carious bones.

418. *Thebaic tincture, commonly called* liquid laudanum. E.

Take of opium, two ounces; ſpirituous cinnamon-water, 20 ounces. Digeſt for four days, and filter.

This is a very elegant liquid opiate; the menſtruum diſſolving nearly the whole ſubſtance of the opium, and effectually covering its ill flavour. The uſual doſe is from 15 to 25 or 30 drops.

419, a. *Tincture of rhubarb.* E.

Take of rhubarb, three ounces; leſſer cardamom-ſeeds, half an ounce; proof-ſpirit two pints. Digeſt for ſeven days, and ſtrain.

b, *Spirituous tincture of rhubarb.* L.

Take of rhubarb, two ounces; leſſer cardamom ſeeds, huſked, half an ounce; ſaffron, two drams; proof-ſpirit, two pints. Digeſt without heat, and ſtrain off the tincture for uſe.

c, *Bitter tincture of rhubarb.* E.

Take of rhubarb, two ounces; gentian root, half an ounce; Virginian ſnake-root, one dram; French brandy, two pints. Digeſt for ſeven days, and then ſtrain off the tincture.

d, *Sweet tincture of rhubarb.* E.

Is made by adding four ounces of ſugar-candy to the ſimple tincture made as above directed, and ſtrained.

All the foregoing tinctures of rhubarb are deſigned as ſtomachics and corroborants, as well as purgatives: ſpirituous liquors excellently extract thoſe parts of the rhubarb in which the two firſt qualities reſide, and the additional ingredients conſiderably promote their efficacy. In weakneſs of the ſtomach, indigeſtion, laxity of the inteſtines, diarrhœas, colicky and other like complaints, theſe medicines are frequently of good ſervice: the ſecond is alſo, in many caſes, an uſeful addition to the Peruvian bark, in the cure of intermittents, particularly in cachectic habits, where the viſcera are obſtructed. In theſe intentions, a ſpoonful or two may be taken for a doſe, and occaſionally repeated.

420, a. *Saturnine tincture.* L.

Take of ſugar of lead, green vitriol, each two ounces; rectified ſpirit of wine, two pints. Reduce the ſalts ſeparately into a powder; then add the ſpirit, and digeſt them together without heat: afterwards filter the tincture through paper.

b. *Antiphthiſical tincture.* E.

Take of ſugar of lead, an ounce and a half; vitriol of iron, an ounce; rectified ſpirit of wine, a pint. Let a tincture be extracted without heat.

The reducing of the ſalts ſeparately into powder, and performing the digeſtion without heat, are very neceſſary circumſtances: for if the ingredients are attempted to be pulverized together, they will grow ſoft and almoſt liquid; and if heat is made uſe of, ſcarce any tincture will be obtained.

Theſe tinctures are ſometimes given from 20 to 30 drops, for reſtraining immoderate ſecretions, particularly the colliquative ſweats attending hectic fevers and phthiſical diſorders, whence the name *antiphthiſical tincture*. They are undoubtedly medicines of great efficacy in theſe caſes, but too dangerous ones to be raſhly ventured on. Some have ſuppoſed that they do not contain any of the ſugar of lead; but experiments made for that purpoſe, have ſhown that they do: and therefore, the London college has very judiciouſly changed the title of their tincture into one expreſſion, its being a preparation of lead.

421, a. *Tincture of ſena.* L.

Take of raiſins, ſtoned, 16 ounces; ſena, one pound; caraway ſeeds, one ounce and a half; leſſer cardamoms, huſked, half an ounce; proof ſpirit, one gallon. Digeſt without heat, and then ſtrain the tincture.

b. *Compound tincture of ſena, commonly called elixir of health.* E.

Take of ſena, two ounces; jalap-root, one ounce; coriander ſeeds, half an ounce; French brandy, three pints. Digeſt for ſeven days; then ſtrain off the tincture, and add to it four ounces of powdered ſugar-candy.

Both theſe tinctures are uſeful carminatives and cathartics, eſpecially to thoſe who have accuſtomed themſelves to the uſe of ſpirituous liquors; they oftentimes relieve flatulent and colicky complaints, where the common cordials have little effect: the doſe is from one to two ounces. Several preparations of this kind have been offered to the public, under the name of *Daffy's elixir*; the two above are equal to any, and ſuperior to moſt of them.

422. *Tincture of ſnakeroot.*

Take of Virginian ſnakeroot, three ounces; proof ſpirit, two pints. Digeſt without heat, and ſtrain off the tincture. *L.*

Take of Virginian ſnakeroot, two ounces; cochineal, one dram; proof ſpirit, two pints. Digeſt in a gentle heat for three days, and then ſtrain the tincture. *E.*

The tincture of ſnakeroot was in the former pharmacopœia directed with the *tinctura ſalis tartari*; which being now expunged, it was propoſed to the college to employ rectified ſpirit; but as the heat of this ſpirit prevents the medicine from being taken in ſo large a doſe as might otherwiſe be, a weaker ſpirit was made choice of. The tincture made in this menſtruum, which extracts the whole virtues of the root, may be taken to the quantity of a ſpoonful or more, every five or ſix hours.

423. *Stomachic tincture.* L.

Take of raiſins, ſtoned, four ounces; cinnamon, half an ounce; caraway ſeeds, leſſer cardamoms, huſked, cochineal, each two drams; proof ſpirit, two pints. Digeſt without heat, and ſtrain off the tinctures.

This is a moderately warm ſtomachic tincture, much more pleaſant than the uſquebaugh of the former pharmacopœias. It may be taken, without any vehicle, to half an ounce or an ounce, though oftener uſed in mixture.

424. *Styptic tincture.* L.

Take of green vitriol, calcined, one dram; French brandy (ſuch as has acquired a yellowiſh tinge from the caſk), two pints. Mix them together, that the ſpirit may grow black; then paſs it through a ſtrainer.

The title of this tincture expreſſes its medicinal intention. The celebrated *ſtyptic of Helvetius*, (which is ſaid to be the ſame with that of *Eaton*), differs from it no otherwiſe than in being more operoſe in compoſition. They are recommended both for internal uſe, and for reſtraining external hæmorrhages: their virtues do not ſeem to depend ſo much on the iron as on the menſtruum, the quantity of metal diſſolved being extremely ſmall. In keeping, the iron is apt to ſeparate, and the liquor to loſe its black colour.

425. *Tincture of ſulphur.*

Take of rectified ſpirit of wine, one pint. Hepar ſulphuris (that is, a mixture of ſulphur and fixed alkaline ſalt melted together) four ounces. Grind the hepar into powder whilſt hot from the fire, add to it the ſpirit, and digeſt in a moderate heat for 24 hours; then pour off the tincture from the fæces.

The digeſtion may be commodiouſly performed in a glaſs receiver: put the ſpirit firſt into the veſſel, and pour the hot powder upon it: then ſhake them together; and to prevent the exhalation of any part of the ſpirit during the digeſtion, inſert a glaſs tube into the mouth of the receiver.

This tincture is of a rich gold colour, a hot aromatic taſte, and a particular, not ungrateful ſmell. Its virtues are thoſe of a warm, attenuating, aperient, and anti-acid medicine. The doſe is from 10 to 60 drops. It is moſt commodiouſly taken in Canary or other rich wines.

426. *Tincture of balſam of Tolu.* E.

Take of balſam of Tolu, an ounce and a half; rectified ſpirit of wine, a pint. Digeſt in a ſand-heat, until the balſam is diſſolved; and then ſtrain the tincture.

This ſolution of balſam of Tolu poſſeſſes all the virtues of the balſam itſelf. It may be taken internally, in the ſeveral intentions for which this valuable balſam is proper, to the quantity of a tea-ſpoonful or two, in any convenient vehicle. Mixed with the plain ſyrup of ſugar, it forms an elegant balſamic ſyrup.

427. *Simple tincture of valerian.* L.

Take of wild valerian root, four ounces; proof ſpirit, two pints. After due digeſtion, ſtrain off the tincture.

The valerian root ought to be reduced into fine powder, otherwiſe the ſpirit will not ſufficiently extract its virtues. The tincture proves of a deep colour, and conſiderably ſtrong of the valerian; though it has not been found to anſwer ſo well in the cure of epileptic diſorders, as the root in ſubſtance, exhibited in the form of powder or bolus. The doſe of the tincture is from half a ſpoonful to a ſpoonful or more, two or three times a-day.

428. *Volatile tincture of valerian.* L.

Take of wild valerian root, four ounces; volatile aromatic ſpirit, two pints. Digeſt without heat in a veſſel cloſely ſtopped, and afterwards ſtrain off the tincture.—The Edinburgh college orders two ounces of the root to a pint of vinous ſpirit of ſal ammoniac, and the digeſtion to be continued for ſix days in a cloſe ſtopped vial.

The volatile ſpirit is here an excellent menſtruum, and at the ſame time conſiderably promotes the virtues of the valerian, which in ſome caſes wants an aſſiſtance of this kind. The doſe may be a tea-ſpoonful or two.

429. *Tincture of veratrum, or white hellebore.* L. E.

Take of white hellebore root, eight ounces; proof ſpirit, two pints. Digeſt them together for ten days, and filter the tincture through paper.

This tincture is ſometimes uſed for acuating cathartics, &c. and as an emetic in apoplectic and maniacal diſorders. It may likewiſe be ſo managed, as to prove a powerful alterative and deobſtruent, in caſes where milder remedies have little effect. But a great deal of caution is requiſite in its uſe: the doſe, at firſt, ought to be only a few drops; if conſiderable, it proves violently emetic or cathartic.

430. *Balſam of guaiacum.* L.

Take of gum guaiacum, one pound; balſam of Peru, three drams; rectified ſpirit of wine, two pints and a half. Digeſt till the gum is diſſolved, and then ſtrain off the balſam.

431. *Elixir of guaiacum.* E.

Take of guaiacum, in powder, one pound; balſam of Peru, three drams; rectified ſpirit of wine, two pounds and a half. Digeſt for 10 days, and ſtrain.

Both theſe compoſitions are medicines of great efficacy, and capable of anſwering many uſeful purpoſes. They warm and ſtrengthen the habit, and promote inſenſible perſpiration. Twenty or thirty drops may be taken two or three times a-day, or oftener, in any proper vehicle, in rheumatic complaints, cutaneous defedations, &c. particularly where the patient is of a cold phlegmatic temperament, and the ſolids weak and relaxed. In hot bilious conſtitutions, and tenſeneſs or rigidity of the veſſels, like other ſtimulating medicines, they are evidently improper.

432. *Volatile elixir of guaiacum.* L.

Take of gum guaiacum, four ounces; balſam of Peru, two drams. Diſtilled oil of ſaſſafras, half a dram; vinous ſpirit of ſal ammoniac, a pound and a half. Macerate for ſix days in a cloſe ſtopped vial, and ſtrain.

433. *Balſamum commendatoris, Beaume de commandeur.*

Take of dry Peruvian balſam, one ounce; ſtorax in the tear, two ounces; benjamin, three ounces; ſocotorine aloes, myrrh, olibanum, angelica roots, St John's-wort flowers, each half an ounce; ſpirit of wine, two pounds eight ounces by weight. Let them ſtand together in the ſun during the dog-days, in a glaſs veſſel cloſely ſtopped; and afterwards ſtrain out the balſam through a linen cloth.

This balſam has been inſerted, with little variation, in ſome foreign pharmacopœias, and likewiſe kept a ſecret in private hands, under the titles of *Balſamum Perſicum*, *Balſam of Berne*, *Wade's balſam*, *Friar's balſam*, *Jeſuits drops*, &c. The form above is taken from the original receipt publiſhed by Pomet (*Hiſtoire des Drogues*, edit. 2. tom. ii. p. 56.) It ſtands greatly recommended, externally, for cleanſing and healing wounds and ulcers, for diſcuſſing cold tumours, allaying gouty, rheumatic, and other old pains and aches; and likewiſe internally, for warming and ſtrengthening the ſtomach and inteſtines, expelling flatulencies, and relieving colicky complaints. Outwardly, it is applied cold on the part with a feather; inwardly, a few drops are taken at a time, in wine or any other convenient vehicle.

434. *Traumatic or vulnerary balſam.*

Take of benzoine, three ounces; ſtorax, ſtrained, two ounces; balſam of Tolu, one ounce; ſocotorine aloes, half an ounce: rectified ſpirit of wine, two pints. Digeſt, that the gums may as much as poſſible be diſſolved: and then ſtrain off the balſam for uſe. *L.*

This is an elegant reformation of the preceding compoſition, conſiderably more ſimple, yet not inferior in efficacy. The balſam of Tolu ſupplies, with advantage, the dry Peruvian balſam, a drug very rare to be met with in this country: the olibanum, myrrh, and angelica roots, here omitted, were certainly ſuperfluous in a medicine containing ſo much more powerful materials; and the St John's-wort flowers are as deſervedly thrown out, as having little elſe to recommend them than prejudice or ſuperſtition.

Take of benzoine, powdered, three ounces; balſam of Peru, two ounces; hepatic aloes, in powder, half an ounce; rectified ſpirit of wine, two pints. Digeſt them in a ſand-heat, for the ſpace of three days; and then ſtrain the balſam. *E.*

This is a further contraction of the *beaume de commandeur*, without any injury to it as a medicine, at leaſt with regard to the purpoſes for which the title ſhews it deſigned. Socotorine aloes is here judiciouſly exchanged for the hepatic, which appears from experience to be the moſt ſerviceable in external applications.

436. *Elixir of aloes.* L.

Take of tincture of myrrh, two pints; ſocotorine aloes, ſaffron, each three ounces. Digeſt them together, and ſtrain off the elixir.

437. *Elixir proprietatis.* E.

Take of tincture of myrrh, two pounds; ſocotorine aloes, three ounces; Engliſh ſaffron, two ounces. Digeſt for eight days, ſuffer the fæces to ſubſide, and pour off the clear elixir.

This is the *elixir proprietatis* of Paracelſus, improved with regard to the manner of preparation.

This medicine is greatly recommended, and not undeſervedly, as a warm ſtimulant and aperient. It ſtrengthens the ſtomach and other viſcera, cleanſes the firſt paſſages from tenacious phlegm, and promotes the natural ſecretions in general. Its continued uſe has frequently done good ſervice in cachectic and icteric caſes, uterine obſtructions, and other like diſorders; particularly in cold, pale, phlegmatic habits: where the patient is of a hot, bilious conſtitution, and florid complexion, this warm ſtimulating medicine is leſs proper, and ſometimes prejudicial. The doſe may be from 20 drops to a tea-ſpoonful or more, two or three times a-day, according to the purpoſes which it is intended to anſwer.

538. *Elixir proprietatis vitriolicum.* E.

Take of myrrh in powder, ſocotorine aloes in powder, each an ounce and a half; Engliſh ſaffron, one ounce; dulcified ſpirit of vitriol, one pint. Digeſt them in a ſand-heat for the ſpace of ſix days; and having then ſuffered the fæces to ſubſide, pour off the clear elixir.

This elixir poſſeſſes the general virtues of the preceding; and is, in virtue of the menſtruum, preferred to it in hot conſtitutions, and weakneſſes of the ſtomach.

439. *Paregoric elixir.*

Take of flowers of benzoin, opium, ſtrained, each one dram; camphor, two ſcruples; eſſential oil of aniſeeds, half a dram; rectified ſpirit of wine, two pints. Digeſt and ſtrain. *L.*

Take of flowers of benzoin, Engliſh ſaffron, of each three drams; opium, two drams; diſtilled oil of aniſeed, half a dram; vinous ſpirit of ſal. ammoniac, one pint. Digeſt four days in a cloſe ſtopped vial, and ſtrain. *E.*

This elixir is taken from Le Mort with the omiſſion of three unneceſſary ingredients, honey, liquorice, and alkaline ſalt. It was originally preſcribed under the title of *elixir aſthmaticum*, which it does not ill deſerve. It contributes to allay the tickling, which provokes frequent coughing; and at the ſame time is ſuppoſed to open the breaſt, and give greater liberty of breathing: the opium procures (as it does by itſelf) a temporary relief from the ſymptoms; whilſt the other ingredients tend to remove the cauſe, and prevent their return. It is given to children againſt the chincough, &c. from five drops to 20; to adults, from 20 to 100.

440. *Acid elixir of vitriol.* L.

Take of the aromatic tincture, one pint; ſtrong ſpirit called *oil*) of vitriol, four ounces. Mix them together; and after the fæces have ſubſided, filter the elixir through paper.

441. In the new edition of the Edinburgh pharmacopœia the *elixir vitrioli* is thus prepared.

Take of cinnamon, one ounce and a half; ginger, one ounce; pepper-mint leaves, dried, half an ounce; oil of vitriol, ſix ounces; rectified ſpirit of wine, two pints. Drop the oil of vitriol by little and little into the ſpirit of wine; and digeſt them together in a ſand-bath, with a very gentle heat, for three days: then add the other ingredients; continue the digeſtion, in the ſame gentle heat for three days longer; and afterwards filter the tincture in a glaſs funnel.

Theſe compoſitions are valuable medicines in weakneſs and relaxations of the ſtomach, and decays of conſtitution, particularly in thoſe which proceed from irregularities, which are accompanied with ſlow febrile ſymptoms, or which follow the ſuppreſſion of intermittents. They have frequently taken place after bitters and aromatics, by themſelves, had availed nothing: and, indeed, great part of their virtue depends on the vitriolic acid; which, barely diluted with water, has, in theſe caſes, where the ſtomach could bear the acidity, produced happy effects.

Fuller relates (in his Medicina gymnaſtica) that he was recovered by *Mynſicht's elixir* (of which the above are improved preparations) from an extreme decay of conſtitution, and continual reachings to vomit. They may be given from 10 to 30 or 40 drops or more, according to the quantity of acid, twice or thrice a-day, at ſuch times as the ſtomach is moſt empty.

442. *Sweet elixir of vitriol.* L.

Take of the aromatic tincture, one pint; dulcified ſpirit of vitriol, eight ounces by weight. Mix them together.

This is deſigned for perſons whoſe ſtomach is too weak to bear the foregoing acid elixir; to the taſte, it is gratefully aromatic, without any perceptible acidity. The dulcified ſpirit of vitriol, here directed, occaſions little or no precipitation upon adding to it the tincture.

443. The Edinburgh college directs this to be made of the ſame ingredients and in the ſame manner as the aromatic tincture, excepting that dulcified ſpirit of vitriol is uſed inſtead of ſpirit of wine.

444. *Compound elixir of myrrh.* L.

Take of extract of ſavin, one ounce; tincture of caſtor, one pint; tincture of myrrh, half a pint. Digeſt them together; and then ſtrain the elixir.

This preparation is a medicine of great importance in uterine obſtructions, and in hypochondriacal caſes; though, poſſibly, means might be contrived of ſuperadding more effectually the virtues of ſavin to a tincture of myrrh and caſtor. It may be given from five drops to twenty or thirty, or more, in pennyroyal water, or any other ſuitable vehicle.

445. *Elixir ſacrum.*

Take rhubarb, cut ſmall, ten drams; ſocotorine aloes, in powder, ſix drams; leſſer cardamom ſeeds, half an ounce; French brandy, two pints. Digeſt for two days; and then ſtrain the elixir.

446 *Camphorated ſpirit of wine.* L. E.

Take of camphor, two ounces; rectified ſpirit of wine, two pints. Mix them together, that the camphor may be diſſolved.

This ſolution of camphor is employed chiefly for external uſes, againſt rheumatic pains, paralytic numbneſſes, inflammations; for diſcuſſing tumours, preventing gangrenes, or reſtraining their progreſs. It is too pungent to be exhibited internally, even when diluted:

Prepara-tion.

nor does the dilution ſucceed well; for on the admixture of aqueous liquors, the champhor gradually ſeparates and runs together into little maſſes.

The moſt convenient method of uniting camphor with aqueous liquors, for internal uſe, ſeems to be by the mediation of almonds, or of mucilages; triturated with thoſe, it readily mingles with water into the form of an emulſion, at the ſame time that its pungency is conſiderably abated. It may alſo be commodiouſly exhibited in the form of an oily draught, expreſſed oils totally diſſolving it.

§ 7. Oils by Infusion and Decoction.

447. Expressed oils extract the reſinous and oily parts of vegetables, but do not act upon or unite with the gummy and mucilaginous: hence the *oleum e mucilaginibus*, or oil of mucilages (n° 450) of the ſhops, contains nothing of the mucilage which its ingredients abound with. Theſe oils may be tinged, by vegetable matters, of almoſt all colours: the leaves of moſt plants communicate a green; yellow flowers, a dilute gold colour; ſome red flowers, a light red; alkanet root, a beautiful and deep red.

448. In making the officinal oils from the leaves of plants, a good deal of care is neceſſary, to give them the fine green colour expected in them. If the boiling of the herb in the oil is not continued till all the aqueous moiſture has exhaled (the mark of which is, the herb's being criſp), the oil will have a dingy yellowiſh hue: if continued longer, it turns black, and contracts an empyreumatic ſmell. The moſt convenient method of managing the proceſs ſeems to be, to ſtrain off the oil when ſufficiently impregnated with the virtues of the plant, and afterwards to let it ſtand in a clean veſſel over a gentle fire, until, by frequent trials on a white tile, it appears to have gained the deep green colour required.

449. *Oil of St John's wort.* L.

Take of the flowers of St John's wort, full blown, freſh gathered, and carefully freed from the cups, four ounces; oil olive, two pints. Pour the oil upon the flowers, and let them ſtand together till the oil is ſufficiently coloured.

450. *Oil of mucilages.* L.

Take of marſhmallow root, freſh, half a pound; linſeed, fenugreek-ſeed, each three ounces; water, two pints; oil olive, four pints. Bruiſe the roots and ſeeds, and gently boil them in the water for half an hour; then add the oil, and continue the boiling till all the water is waſted; afterwards let the oil be carefully poured off for uſe.

451. *Oil of elder.* L.

Take of elder-flowers, one pound; oil-olive, two pints. Boil the flowers in the oil, till they are almoſt criſp; then preſs out the oil, and ſet it by till the feces have ſubſided.

452. *Green oil.* L.

Take of bay leaves, rue leaves, marjoram leaves, ſea-wormwood leaves, chamomile leaves, each, freſh gathered, three ounces; oil olive, two pints. Bruiſe the herbs, and gently boil them in the oil till they are almoſt criſp; then preſs out the oil, let it ſtand to ſettle, and afterwards pour it off from the ſediment.

Prepara-tions.

All the foregoing oils are deſigned for external applications only. They were ſuppoſed, beſides the general emollient quality of the oil itſelf, to receive particular virtues from the ingredients. At preſent there are few who expect much more from theſe preparations than from common oil itſelf, which has the advantage of being leſs offenſive. The mucilaginous ingredients, marſhmallow root and linſeed, in the *oleum e mucilaginibus*, make no addition to the virtue of the oil; for mucilages, as already obſerved, are not ſoluble in oils. Experience has not diſcovered any ſuch ſingular qualities in flowers of St John's wort, that four ounces of them ſhould communicate any remarkable virtue to a quart of oil. Of the other herbs, the more valuable parts are diſſipated by the boiling heat: and although the remaining matter, if it was taken internally, either by itſelf, or diſſolved in watery or ſpirituous liquors, might not be deſtitute of activity, yet it can ſcarcely be ſuppoſed, when combined with a large quantity of oil, to have any material effect in external applications. The number of theſe oils has, therefore, been judiciouſly retrenched at the late reformation: the four, above retained by the London college, are not one-tenth part of thoſe which were formerly ordered to be kept in the ſhops. The moſt certain way of anſwering the purpoſes intended by theſe preparations appears to be, by mixing with the expreſſed oil a ſuitable quantity either of the native reſins of vegetables, or of the eſſential oils and reſinous extracts artificially prepared from them.

452. *Camphorated oil.* E.

Take of freſh-drawn oil of almonds, or linſeed, two ounces; camphor, half an ounce. Diſſolve the camphor in the oil.

This oil is deſigned, like the foregoing ones, for external purpoſes; particularly againſt burns, rheumatic pains, &c.

453. *Odoriferous oil.*

Let ſome fine carded cotton be dipped in oil of olive, or oil of ben nuts, that it may be thoroughly imbibed with the oil, without retaining ſo much as to drip ſpontaneouſly. Lay a bed of this cotton in the bottom of a tin or porcelane veſſel, and lightly ſpread upon it a pretty thick layer of any odoriferous flowers freſh gathered, as jaſmine flowers, violets, lilies of the valley, &c. Above theſe, ſpread more of the cotton, and then more flowers, alternately, till the veſſel is full; than cover it cloſe, and let it ſtand for twenty-four hours in a gentle warmth. Great part of the fragrance of the flowers will be communicated to the oil in the cotton, which is to be ſtratified in the ſame manner with two or three freſh quantites of the flowers, till it is ſufficiently impregnated therewith; after which the oil is to be ſqueezed out from the cotton in a preſs.

This appears to be the moſt effectual method of transferring into expreſſed oils the odoriferous matter of thoſe tender flowers which yield little or no eſſential oil: the perfumed oils and eſſences of thoſe flowers brought from Italy, are prepared in this manner. The odorous parts may be again ſeparated from the oil, and transferred into water or ſpirit, by diſtillation with thoſe liquors.

SECT. IV. *Conſervation of recent Vegetables and their Infuſions, &c. by Sugar and Honey.*

§ 1. CONSERVES.

454. CONSERVES are compoſitions of recent vegetable matters and ſugar beaten together into an uniform maſs.

This management was introduced for preſerving certain ſimples, undried, in an agreeable form, with as little alteration as poſſible in their native virtues; and to ſome ſubjects it is very advantageouſly applied. Vegetables, whoſe virtues are loſt or deſtroyed in drying, may in this form be kept uninjured for a length of time: for, by carefully ſecuring the mouth of the containing veſſel, the alteration, as well as diſſipation, of their active principles, is generally prevented; and the ſugar preſerves them from the corruption which juicy vegetables would otherwiſe undergo.

There are, however, ſundry vegetables whoſe virtues are impaired by this treatment. Mucilaginous ſubſtances, by long lying with ſugar, become leſs glutinous, and aſtringents ſenſibly ſofter upon the palate. Many of the fragrant flowers are of ſo tender and delicate a texture, as almoſt entirely to loſe their peculiar qualities on being beaten or bruiſed.

In general, it is obvious, that in this form, on account of the large admixture of ſugar, only ſubſtances of conſiderable activity can be taken to advantage as medicines. And indeed, conſerves are at preſent conſidered chiefly as auxiliaries to medicines of greater efficacy, or as intermediums for joining them together. They are very convenient for reducing into boluſes or pills the more ponderous powders, as mercurius dulcis, the calces of iron, and other mineral preparations; which with liquid or leſs conſiſtent matters, as ſyrups, will not cohere.

The ſhops were formerly encumbered with many conſerves altogether inſignificant; the few now retained have in general either an agreeeable flavour to recommend them, or are capable of anſwering ſome uſeful purpoſes as medicines. Their common doſe is the bulk of a nutmeg, or as much as can be taken up at once or twice upon the point of a knife. There is in general no great danger of exceeding in this particular.

455. *General method of preſerving conſerves.*

Leaves are picked from the ſtalks, and flowers from their cups. They are beaten in a marble mortar, with a wooden peſtle, into a ſmooth maſs; after which thrice their weight of double-refined ſugar is added by degrees, and the beating continued till they are uniformly mixed.

The ſugar ſhould be pulveriſed by itſelf, and paſſed through a ſieve, before it is mixed with the vegetable maſs; otherwiſe it cannot eaſily be reduced to ſufficient fineneſs, ſo as to be duly incorporated. Some vegetables are ſcarce reducible to the requiſite fineneſs by beating in a mortar; ſuch is orange-peel. This is moſt conveniently raſped or grated off from the fruit, then well mixed with the ſugar, and the compound ſet by in a cloſe veſſel for ſome weeks; after which it may be beaten ſmooth with conſiderably leſs labour than at firſt. This peel, and red roſe-buds, are commonly ground in a wooden mill made for that purpoſe.

456. *Conſerve of the leaves of garden ſcurvy-graſs.* L.

This is the only form that ſcurvy-graſs in ſubſtance can be kept in without the total loſs of its virtues. The conſerve retains the full taſte and virtue of the herb for a very conſiderable length of time, as a year or two, provided the veſſel be made perfectly cloſe and ſet in a cool place. It may be given in ſcorbutic habits three or four times a-day, or oftener.

457. *Conſerve of the leaves of wood-ſorrel.* L.

This is a very elegant and grateful conſerve; in taſte it is lightly acidulous, with a peculiar flavour, which ſome reſemble to that of green-tea. It is taken occaſionally for quenching thirſt, and cooling the mouth and fauces, in hot diſtempers. It may be uſefully joined to the foregoing preparation, whoſe virtue it ſomewhat promotes, at the ſame time that it improves the taſte.

458. *Conſerve of the leaves of ſpearmint.* L.

The conſerve of mint retains the taſte and virtues of the herb. It is given in weakneſs of the ſtomach and retchings to vomit; and not unfrequently does ſervice in ſome caſes of this kind, where the warmer and more active preparations of mint would be leſs proper.

459. *Conſerve of the leaves of rue.* L.

This conſerve is given from a dram to half an ounce in crudities of the primæ viæ, for promoting digeſtion, and in hyſteric diſorders: it gently ſtimulates the ſolids, attenuates viſcid juices, and excites the natural ſecretions. Some have had a great opinion of it, taken in a morning, as a preſervative againſt the effects of contagious air or exhalation.

460. *Conſerve of the tops of ſea-wormwood.* L.

The conſerve of wormwood has been celebrated in dropſies: Matthiolus relates, that ſeveral perſons were cured by it of that diſtemper, without the aſſiſtance of any other medicine. Where the diſorder indeed proceeds from a ſimple laxity or flaccidity of the ſolids, the continued uſe of this medicine may be of ſome ſervice, as it appears to be a not inelegant mild corroborant. It is directed to be given in the doſe of half an ounce, about three hours before meals.

461. *Conſerve of the buds of red roſes.* L.

This is a very agreeable and uſeful conſerve. A dram or two, diſſolved in warm milk, are frequently given as a light reſtringent in weakneſs of the ſtomach, and likewiſe in coughs and phthiſical complaints. In the German Ephemerides, examples are related of very dangerous phthiſes cured by the continued uſe of this medicine: in one of theſe caſes, 20 pounds of the conſerve were taken in the ſpace of a month; and in another, upwards of 30. Riverius mentions ſeveral other inſtances of this kind.

462. *Conſerve of roſemary-flowers.* L.

Roſemary-flowers in great meaſure loſe their peculiar fragrance by beating; and hence the conſerve has very little of their flavour. Some are therefore accuſtomed to make this preparation from the leaves of the plant, (which retain their virtues under the peſtle), or at leaſt to add a portion of theſe to the flowers. The conſerve of roſemary is directed in weakneſs of the nerves, and as a light cordial.

463. *Conſerve of the yellow rind of Seville orange-peel.* L.

This conſerve is a very elegant one, containing all the virtues of the peel in a form ſufficiently agreeable both with regard to the doſe and the conveniency of taking. It is a pleaſant, warm ſtomachic, and in this intention is frequently made uſe of.

464. *Conſerves of ſloes.* L.

Let the ſloes be put into water, and ſet over the fire till they grow ſoft, with care that they do not burſt. Then take the ſloes out of the water, preſs out their pulp, and mix with it thrice its weight of double-refined ſugar.

This preparation is a gentle aſtringent, and may be given as ſuch in the doſe of two or three drams. The degree of its aſtringency will vary according to the maturity of the ſloes and the length of time that the conſerve has been kept.

§ 2. PRESERVES.

465. PRESERVES are made by ſteeping or boiling recent ſimples, firſt in water, and then in ſyrup or ſolution of ſugar. The ſubject is afterwards either kept moiſt in the ſyrup; or taken out and dried, that the ſugar may candy upon it: this laſt is the moſt uſual method.

In this proceſs ſome of the moſt valuable parts of the ſubject are extracted by the liquor, and conſequently loſt to the preparation; greater regard being here had to palatableneſs than medicinal efficacy. And indeed moſt of the preparations of this kind are conſidered rather as ſweetmeats than as medicines, as the buſineſs of the confectioner rather than of the apothecary. It would be needleſs therefore to mention the doſes of the ſeveral articles, or give particular remarks on the manner of preparing them.

466. *Candied eryngo roots.* L.

Boil them in water till the rind will eaſily peel off; when peeled, ſlit them through the middle, take out the pith, and waſh them three or four times in cold water. For every pound of the roots ſo prepared, take two pounds of double-refined ſugar, which is to be diſſolved in a proper quantity of water, and ſet over the fire: as ſoon as the liquor begins to boil, put in the roots, and continue the boiling till they are ſoft.

467. After this manner are candied, *Angelica ſtalks*, &c.

468. *Candied orange-peel.* L.

Steep the freſh peels of Seville oranges in water; which is to be frequently renewed, until they loſe their bitterneſs. Then, having diſſolved in water a ſuitable quantity of double-refined ſugar, boil the peels in this liquor till they become ſoft and tranſparent.

469. After the ſame manner are candied, *Lemon-peels*.

470. *Nutmegs* and *ginger* are brought to us ready candied from the Eaſt Indies. E.

471. *Candied ſteel.*

Put any quantity of clean filings of iron into a braſs kettle, ſuſpended over a very gentle fire. Add to them, by little and little, twice their weight of white ſugar, boiled to the conſiſtence of candy, with which powdered ſtarch has been previouſly mixed in the proportion of a dram to every pound; agitating the kettle continually, that the filings may be cruſted over with the ſugar, and taking great care to prevent their running into lumps.

This is a very agreeable preparation of ſteel; but has hitherto been made only by the confectioners. The college of Edinburgh received it in the former editions; but, as there deſcribed, it was almoſt impoſſible to hinder the matter from concreting into lumps. They have now diſcovered the intermedium which prevents that inconvenience, and which the confectioners have kept a ſecret, the addition of a little ſtarch to the ſugar. The preparation may be given to the quantity of half a dram, in thoſe caſes wherein chalybeate medicines are proper.

§ 3. GELLIES.

472—477. VEGETABLE gellies are compoſed of the juices of fruits and ſugar, boiled to a thick conſiſtence. Independently of the admixture of ſugar, the boiling appears to occaſion ſome alteration in the quality of the juices themſelves. The recent juices of the ſummer fruits are prone to fermentation: after they have been boiled, they are leſs diſpoſed to ferment, and at the ſame time they are much leſs liable to produce, in the human body, flatulencies, gripes, or fluxes; tho' they ſtill retain, in no ſmall degree, their original antiſeptic, anti-inflammatory, and aperient or reſtringent virtues.

§ 4. SYRUPS.

478. SYRUPS are ſaturated ſolutions of ſugar made in water, or watery or vinous infuſions, or in juices. They were formerly conſidered as medicines of much greater importance than they are thought to be at preſent. Syrups and diſtilled waters were for ſome ages made uſe of as the great alteratives; inſomuch that the evacuation of any peccant humour was never attempted till, by a due courſe of theſe, it had firſt been regularly prepared for expulſion. Hence aroſe the exuberant collection of both which we meet with in pharmacopœias; and like errors have prevailed in each. As multitudes of diſtilled waters have been compounded from materials unfit to give any virtue over the helm, ſo numbers of ſyrups have been prepared from ingredients which in this form cannot be taken in ſufficient doſes to exert their virtue; for two thirds of a ſyrup conſiſt of ſugar, and greateſt part of the remaining third is an aqueous fluid.

479. Syrups are at preſent chiefly regarded as convenient vehicles for medicines of greater efficacy; and made uſe of for ſweetening draughts and juleps, for reducing the lighter powders into boluſes, pills, or electuaries, and other like purpoſes. Some likewiſe may not improperly be conſidered as medicines themſelves; as thoſe of ſaffron and buckthorn-berries.

480. *General rules for preparing ſyrups.*

I. All the rules laid down for making decoctions are likewiſe to be obſerved in the decoctions for ſyrups. Vegetables, both for decoctions and infuſions, ought to be dry, unleſs they are expreſsly ordered otherwiſe.

II. Only the pureſt or double-refined ſugar ought to be uſed.

In the ſyrups prepared by boiling, it has been cuſtomary to perform the clarification with whites of eggs after the ſugar had been diſſolved in the decoction of the vegetable. This method is apparently injurious to the preparation; ſince not the impurities only of the ſugar are thus diſcharged, but a conſiderable part likewiſe of the medicinal matter, which the water had before taken up from the ingredients, is ſeparated along with them. Nor indeed is the clarification and deſpumation of the ſugar, by itſelf, very adviſable; for its purification by this proceſs is not ſo perfect as might be expected: after it has undergone this proceſs, the refiners ſtill ſeparate from it a quantity of oily matter, which is diſagreeable to weak ſtomachs. It appears therefore moſt eligible to employ fine ſugar for all the ſyrups; even the purgative ones (which have been uſually made with coarſe ſugar, as ſomewhat coinciding with their intention) not excepted; for as the purgative medicines are in general ungrateful to the ſtomach, it is certainly improper to employ an addition which increaſes their offenſiveneſs.

III. Where the weight of the ſugar is not expreſſed, 29 ounces thereof are to be taken to every pint of liquor. The ſugar is to be reduced into powder, and diſſolved in the liquor by the heat of a water-bath, unleſs ordered otherwiſe. *L.*

Although in the formulæ of ſeveral of the ſyrups, a double weight of ſugar to that of the liquor is directed, yet leſs will generally be ſufficient. Firſt, therefore, diſſolve in the liquor an equal weight of ſugar; then gradually add ſome more in powder till a little remains undiſſolved at the bottom, which is to be afterwards incorporated by ſetting the ſyrup in a water-bath.

The quantity of ſugar ſhould be ſo much as the liquor is capable of keeping diſſolved in the cold: if there is more, a part of it will ſeparate and concrete into cryſtals or candy; if leſs, the ſyrup will be ſubject to ferment, eſpecially in warm weather, and change into a vinous or ſour liquor. If, in cryſtallizing, only the ſuperfluous ſugar ſeparated, it would be of no inconvenience; but when part of the ſugar has candied, the remaining ſyrup is found to have an under proportion, and is as ſubject to fermentation as if it had wanted ſugar at firſt.

IV. Copper-veſſels, unleſs they are well tinned, ſhould not be employed in the making of acid ſyrups, or ſuch as are compoſed of the juices of fruits.

The confectioners, who are the moſt dextrous people at theſe kinds of preparations, to avoid the expence of frequently new-tinning their veſſels, rarely make uſe of any other than copper ones untinned, in the preparation even of the moſt acid ſyrups, as of oranges and lemons. Nevertheleſs, by taking due care that their coppers be well ſcoured and perfectly clean, and that the ſyrup remain no longer in them than is abſolutely neceſſary, they avoid giving it any ill taſte or quality from the metal. This practice, however, is by no means to be recommended to the apothecary.

V. The ſyrup, when made, is to be ſet by till next day: if any ſaccharine cruſt appears upon the ſurface, take it off. *L.*

481. *Syrup of garlick.* L.

Take of garlic, ſliced, one pound; boiling water, two pints. Macerate them in a cloſe veſſel for twelve hours; then ſtrain off the liquor, and diſſolve in it a proper quantity of ſugar, ſo as to make a ſyrup.

This ſyrup is occaſionally made uſe of for attenuating viſcid phlegm, and promoting expectoration in humoral aſthmas and oppreſſions of the breaſt: in theſe caſes, it proves a medicine of conſiderable efficacy, though a very unpleaſant one; it taſtes and ſmells ſtrongly of the garlic. The college have received it as an alternative to the oxymel of garlic, for the uſe of thoſe with whom honey diſagrees.

482. *Syrup of marſhmallows.*

Take of marſhmallow roots, freſh, one pound; double-refined ſugar, four pounds; water, one gallon. Boil the water with the roots to one half: when grown thoroughly cold, pour off and preſs out the decoction, and ſet it by for a night to ſettle: next morning pour off the clear liquor, and, adding to it the ſugar, boil the whole to the weight of ſix pounds. *L.*

Take of moderately dried marſhmallow-roots, nine ounces; white ſugar, four pounds; water, a gallon. Boil the water with the marſhmallow-roots to the conſumption of one half; then ſtrain out the remaining decoction, and ſuffer it to reſt for ſome time. Pour off the clear liquor from the ſediment, and boil it with the ſugar over a gentle fire, keeping the matter continually ſtirring till it becomes a ſyrup. *E.*

The ſyrup of marſhmallows is uſed chiefly in nephritic caſes, for ſweetening emollient decoctions, and the like: of itſelf it can do little ſervice, notwithſtanding the high opinion which ſome have entertained of it; for what can be expected from two or three ſpoonfuls of the ſyrups, when the decoction, from which two or three pounds are made, may be taken at a draught or two? The college of Edinburgh has very properly united this and the *pectoral ſyrup* into one; for the ſyrup of marſhmallows has always, till the late reformation, contained the principal ingredients of the pectoral ſyrup, and its own capital ingredient coincides in the ſame intention.

483. *Syrup of orange-peel.*

Take of the yellow rind of Seville orange-peel, freſh, eight ounces; boiling water, five pints. Macerate them for a night in a cloſe veſſel; next morning ſtrain out the liquor, and diſſolve in it the proper quantity of ſugar for making it into a ſyrup. *L.*

Take of the yellow rind of orange-peel, freſh, ſix ounces; boiling water, three pints. Infuſe them for a night in a cloſe veſſel: then ſtrain the liquor; let it ſtand to ſettle; and, having poured it off clear from the ſediment, diſſolve therein ſeven pounds and a quarter of white ſugar, ſo as to make it into a ſyrup without boiling. *E.*

In making this ſyrup, it is particularly neceſſary that the ſugar be previouſly powdered, and diſſolved in the infuſion with as gentle a heat as poſſible, to prevent the exhalation of the volatile parts of the peel. With theſe cautions, the ſyrup proves a very elegant and agreeable one, poſſeſſing great ſhare of the fine flavour of the orange-peel.

484, a. *Balſamic-ſyrup.*

Take of balſam of Tolu, eight ounces; water, three pints. Boil them for two or three hours in a circulatory veſſel, or at leaſt in a long-necked matraſs, having its mouth lightly covered. When grown cold, ſtrain out the liquor, and mix therewith a proper quantity of ſugar to make it into a ſyrup. *L.*

The coction may be conveniently performed in a retort, with a receiver adapted to it, the liquor which comes over being occaſionally poured back; or the water may be entirely drawn off, and the ſugar diſſolved in the diſtilled liquor.

Take of the ſyrup of ſugar, juſt made, and warm from the fire, two pounds; tincture of balſam of Tolu, one ounce. When the ſyrup has grown almoſt cold, ſtir into it the tincture by little at a time, agitating them well together till perfectly united. The mixture is then to be kept in the heat of a water-bath until the ſpirit has exhaled. *E.*

The intention of the contrivers of the two foregoing proceſſes ſeems to have been ſomewhat different. In the firſt, the more ſubtle and fragrant parts of the balſam are extracted from the groſſer reſinous matter, and alone retained in the ſyrup: the other ſyrup contains the whole ſubſtance of the balſam in larger quantity. They are both moderately impregnated with the agreeable flavour of the balſam.

In ſome pharmacopœias, an elegant ſyrup of this kind is prepared from a tincture of balſam of Peru, with roſe-water and a proper quantity of ſugar.

484, b. *Syrup of clove-julyflowers.*

Take of clove-julyflowers, freſh gathered, and freed from the heels, three pounds; boiling water, five pints. Macerate them for a night in a glaſs or glazed earthen veſſel; then ſtrain off the liquor, and diſſolve therein its due proportion of ſugar to make it into a ſyrup. *L.*

One pound of the flowers is to be infuſed in three pints of water, and the ſyrup made as above without boiling. *E.*

This ſyrup is of an agreeable flavour, and a fine red colour; and for theſe it is chiefly valued. Some have ſubſtituted to it one eaſily parable at ſeaſons when the flowers are not to be procured: An ounce of clove ſpice is infuſed for ſome days in 12 ounces of white-wine, the liquor ſtrained, and, with the addition of 20 ounces of ſugar, boiled to a proper conſiſtence: a little cochineal renders the colour of this ſyrup exactly ſimilar to that prepared from the clove-julyflower; and its flavour is of the ſame kind, though not ſo pleaſant. The abuſe may be readily detected, by adding to a little of the ſyrup ſome alkaline ſalt or ley, which will change the genuine ſyrup to a green colour; but in the counterfeit, it will make no ſuch alteration, only varying the ſhade of the red.

484, c. *Syrup of colchicum.* E.

Take of the root of colchicum, cut into thin ſlices, one ounce; vinegar, one pint; fine ſugar, 26 ounces. Digeſt the root for two days in the vinegar, ſhaking the veſſel now and then; then ſtrain, preſſing out the liquor ſlightly. Add the ſugar to the ſtrained liquor, and boil it gently to the conſiſtence of a ſyrup.

485. *Syrup of ſaffron.* L.

Take of ſaffron wine, one pint; double-refined ſugar, 15 ounces. Diſſolve the ſugar in the wine, ſo as to make a ſyrup thereof.

Saffron is very well fitted for making a ſyrup, as in this form a ſufficient doſe of it is contained in a reaſonable compaſs. This ſyrup is at preſent more frequently preſcribed than the wine from which it is made: it is a pleaſant cordial, and gives a fine colour to juleps.

486. *Syrup of quinces.* L.

Take of quince-juice, depurated, three pints; cinnamon, one dram; cloves, ginger, each half a dram; red port wine, one pint; double-refined ſugar, nine pounds. Digeſt the juice with the ſpices, in the heat of aſhes, for ſix hours; then adding the wine, paſs the liquor through a ſtrainer; and afterwards diſſolve in it the ſugar, ſo as to make a ſyrup.

If the quinces are kept for ſome time in an airy place before the juice is preſſed out, the ſyrup proves rather more elegant, and richer of the fruit than when they are taken freſh from the tree. In either caſe, the preparation is a very agreeable, mild, cordial reſtringent; and in ſome kinds of looſeneſſes and diſorders of the ſtomach, may be either taken by itſelf in the quantity of a ſpoonful or two at a time, or employed for reconciling to the palate and ſtomach medicines of the more ungrateful kind.

487. *Syrup of kermes.*

This ſyrup, which is brought to us ready made, from the ſouthern parts of France, is of an agreeable taſte, and a fine red colour. It is accounted cordial and corroborant, and ſuppoſed to be particularly ſerviceable in weakneſſes and other diſorders of pregnant women.

488. *Syrup of lemon-juice.* L. E.

Take of juice of lemons, ſuffered to ſtand till the fæces have ſubſided, and afterwards ſtrained, two pints; double-refined ſugar, 50 ounces. Diſſolve the ſugar in the juice, ſo as to make a ſyrup thereof. *L.*

After the ſame manner are prepared,

489. *Syrup of mulberries.* L.

490. *Syrup of raſpberries.* L.

All theſe are very pleaſant, cooling ſyrups; and in this intention are occaſionally made uſe of in draughts and juleps, for quenching thirſt, abating heat, &c. in bilious or inflammatory diſtempers. They are ſometimes likewiſe employed in gargariſms for inflammations of the mouth and tonſils.

Prepara-tions.

491, a. *Syrup of meconium, or diacodium.* L.

Take of white poppy heads, dried and cleared from the ſeeds, three pounds and a half; water, ſix gallons. Cut the heads, and boil them in the water, ſtirring them now and then, to prevent their burning, till only about one third part of the liquor remains, which will be almoſt entirely ſoaked up by the poppies. Then remove the veſſel from the fire, ſtrongly preſs out the decoction, and boil it down to about four pints: ſtrain it whilſt hot, firſt through a ſieve, and afterwards through a fine woollen cloth; and ſet it by for a night, that the fæces may ſubſide. Next morning pour the liquor off clear, and boil it with ſix pounds of double-refined ſugar, until the weight of the whole is nine pounds, or a little more, that it may become a ſyrup of a proper conſiſtence.

This ſyrup, impregnated with the opiate matter of the poppy-heads, is given to children in doſes of two or three drams, to adults from half an ounce to an ounce and upwards, for obtunding and incraſſating acrimonious humours, eaſing pain, procuring reſt, and anſwering the other intentions of mild opiates. Particular care is requiſite in its preparation, that it may be always made, as nearly as poſſible, of the ſame ſtrength; and accordingly the college has been very minute in their deſcription of the proceſs.

491, b. *Syrup of white poppies, or of meconium, commonly called diacodium.* E.

Take of white poppy heads, juſt ripe, and moderately dried, two pounds; boiling-water, three gallons. Let theſe be ſteeped together for a night, and then boiled until half the liquor is waſted: ſtrain, and ſtrongly preſs out the remainder; and boil it, with the addition of four pounds of white ſugar, to the conſiſtence of a ſyrup.

This proceſs is conſiderably different from the preceding. The poppy-heads are not boiled ſo long; and their quantity, in proportion to the produce of ſyrup, is much leſs. How far theſe differences may affect the ſtrength of the preparations, we ſhall not take upon us to determine.

492. *Syrup of wild poppies.* L.

Take of wild poppy flowers, freſh, four pounds; boiling-water, four pints and a half. Pour the water on the poppies, ſet them over the fire, and frequently ſtir them, until the flowers are thoroughly moiſtened: as ſoon as they have ſunk under the water, let the whole be ſet by to ſteep for a night; next day pour off, and preſs out the liquor, and ſet it by for a night longer to ſettle; afterwards add the proper quantity of double-refined ſugar to make it into a ſyrup.

The deſign of ſetting the flowers over the fire, is, (as Dr Pemberton obſerves), that they may be a little ſcalded, ſo as to ſhrink enough to be all immerged in the water; without this artifice, they can ſcarce be all got in: but they are no longer to be continued over the fire than till this effect is produced, leſt the liquor become too thick, and the ſyrup be rendered ropy.

This ſyrup has been recommended in diſorders of the breaſt, coughs, ſpitting of blood, pleuriſies, and other diſeaſes, both as an emollient and as an opiate. It is one of the lighteſt of the opiate medicines, and in this reſpect ſo weak, that ſome have doubted of its having any anodyne quality.

493. *Pectoral ſyrup.* L. [See 482.]

Take of Engliſh maidenhair, dried, five ounces; liquorice, four ounces; boiling-water, five pints. Macerate them for ſome hours: then ſtrain out the liquor, and with a proper quantity of double-refined ſugar make it into a ſyrup.

The title of this compoſition expreſſes its medicinal intention: it is ſuppoſed to ſoften acrimonious humours, allay tickling coughs, and promote the expectoration of tough phlegm.

494, a. *Solutive ſyrup of roſes.* L.

Take the liquor that remains after the diſtillation of ſix pounds of damaſk roſes; double-refined ſugar, five pounds. Having preſſed out the liquor from the roſes, boil it down to three pints, and ſet it by for a night to ſettle: next morning pour it off clear from the ſediment; and adding the ſugar, boil the mixture to the weight of ſeven pounds and a half.

494, b. *Syrup of pale roſes.* E.

Take of pale roſes, freſh gathered, one pound; boiling-water, three pints; white ſugar, three pounds. Macerate the roſes in the water for a night: then ſtrain the liquor; and adding to it the ſugar, boil them into a ſyrup. This ſyrup may likewiſe be made from the liquor remaining after the diſtillation of roſe-water, depurated from its fæces.

The liquor remaining after the diſtillation of roſes (provided the ſtill has been perfectly clean) is as proper for making this ſyrup as a freſh infuſion; for the diſtillation only collects thoſe volatile parts which are diſſipated in the air, whilſt the infuſion is boiling to its conſiſtence. This ſyrup is an agreeable and mild purgative for children, in the doſe of half a ſpoonful, or a ſpoonful. It likewiſe proves gently laxative to adults, and in this intention may be of ſervice in coſtive habits. Its principal uſe is in ſolutive glyſters.

494, c. *Syrup of dry roſes.* E.

Take of red roſes, dried, ſeven ounces; white ſugar, ſix pounds; boiling-water, four pints. Infuſe the roſes in the water for a night; then boil them a little, ſtrain out the liquor, and, adding to it the ſugar, boil them to the conſiſtence of a ſyrup.

This ſyrup is ſuppoſed to be mildly aſtringent; but is principally valued on account of its red colour.

495. *Syrup of ſquills.*

Take of vinegar of ſquills, a pint and a half; cinnamon, ginger, each one ounce; double-refined ſugar, three pounds and a half. Steep the ſpices in the vinegar for three days; then ſtrain out the liquor, and add the ſugar ſo as to make a ſyrup thereof. *L.*

Take of vinegar of ſquills, a pound and an half; white ſugar, three pounds and an half. Make them into a ſyrup, without boiling. *E.*

The ſpices, in the firſt of theſe compoſitions, ſomewhat alleviate the offenſiveneſs of the ſquills, though not ſo much as to prevent the medicine from being dif-

Preparations.

diſagreeable. It is uſed chiefly, in doſes of a ſpoonful or two, for attenuating viſcid phlegm, and promoting expectoration, which it does very powerfully.

496. *The ſimple ſyrup, or ſyrup of ſugar.* E.

Take of white ſugar, water, each equal quantities. Boil them into a ſyrup.

This preparation is a plain liquid ſweet, void of flavour or colour. It is convenient for ſundry purpoſes where theſe qualities are not wanted, or would be exceptionable.

497, a. *Syrup of buckthorn.*

Take of the juice of ripe and freſh buckthorn-berries, one gallon; cinnamon, ginger, nutmegs, each one ounce; double-refined ſugar, ſeven pounds. Set the juice by for ſome days to ſettle; then paſs it thro' a ſtrainer, and in ſome part thereof macerate the ſpices. Boil the reſt of the juice, adding towards the end that part in which the ſpices were macerated, firſt paſſed through a ſtrainer: this part of the proceſs muſt be ſo managed, that the whole liquor may be reduced to four pints. Laſtly, put in the ſugar, and make the mixture into a ſyrup. *L.*

Take of the juice of ripe buckthorn-berries, depurated, ſix pounds; white ſugar, three pounds and an half. Boil them to the conſiſtence of a ſyrup. *E.*

This ſyrup, in doſes of three or four ſpoonfuls, operates as a briſk cathartic. The principal inconveniences attending it are, its being very unpleaſant, and occaſioning a thirſt and dryneſs of the mouth and fauces, and ſometimes violent gripes: both theſe may be prevented by drinking liberally of water-gruel, or other warm liquids, during the operation. The ungratefulneſs of the buckthorn is endeavoured to be remedied by the addition of aromatics, which, however, are ſcarcely ſufficient for that purpoſe.

497, b. *Syrup of violets.*

Take of violets, freſh, and well coloured, two pounds; boiling-water, five pints. Macerate them for a whole day in a glaſs, or at leaſt a glazed earthen veſſel; then pour out the liquor, and paſs it through a thin linen-cloth, carefully avoiding even the lighteſt preſſure: afterwards, adding the due proportion of ſugar, make it into a ſyrup. *L.*

Take of March violets, freſh, one pound; boiling water, three pints. Steep them together for a night, in a glazed earthen veſſel cloſe covered: then ſtrain out the liquor, and diſſolve in it ſeven pounds and a quarter of white ſugar, ſo as to make a ſyrup without boiling. *E.*

This ſyrup is of a very agreeable flavour; and, in the quantity of a ſpoonful or two, proves to children gently laxative. It is apt to loſe, in keeping, the elegant blue colour, for which it is chiefly valued; and hence ſome have been induced to counterfeit it with materials whoſe colour is more permanent. This abuſe may be readily diſcovered, by adding to a little of the ſuſpected ſyrup any acid or alkaline liquor. If the ſyrup is genuine, the acid will change its blue colour to a red, and the alkali will change it to a green; but if counterfeit, theſe changes will not happen.

498. *Syrup of ginger.*

Take of ginger, cut into thin ſlices, four ounces; boiling water, three pints. Macerate them for ſome hours; then ſtrain out the liquor, and make it into a ſyrup with a proper quantity of double-refined ſugar. *L.*

Take of ginger, ſliced and bruiſed, three ounces; white ſugar, ſeven pounds and a quarter; boiling-water, three pints. Steep the ginger in the water, in a cloſe veſſel, for a night; then boil them a little, and having ſtrained out the decoction ſet it by to ſettle. Pour off the clear liquor, add to it the ſugar, and make them into a ſyrup. *E.*

This is an agreeable and moderately aromatic ſyrup, lightly impregnated with the flavour and virtues of the ginger.

499. *Confection of kermes.* L.

Take of juice of kermes-grains, warmed and ſtrained, three pounds; damaſk roſe-water, ſix ounces by meaſure; oil of cinnamon, half a ſcruple; double-refined ſugar, one pound. Diſſolve the ſugar in the roſe-water, by the heat of a water-bath, into a ſyrup; then mix in the juice of kermes, and, after it has grown cold, the oil of cinnamon. *L.*

This is a very elegant and agreeable cordial; the doſe, when taken by itſelf, is from a ſcruple to a dram or more. Particular care ought to be had in the choice of the eſſential oil, which for the moſt part is grievouſly adulterated: it would be convenient to grind the oil with a little of the ſugar, before it is added to the other ingredients; for by this means, it will mix more perfectly, and not be apt to ſeparate in keeping.

500. *Rob of elder-berries.* E.

Take of the juice of ripe elder-berries, four pounds; fine ſugar, half a pound. Boil them on a gentle fire to the conſiſtence of thick honey.

§ 5. HONEYS AND OXYMELS.

THE more fixed parts of vegetables, diſſolved in watery liquors, may be thence transferred into honey, by mixing the honey with the watery decoction or juice of the plant, and boiling them together till the aqueous part has exhaled, and the honey remains of its original conſiſtence.

501. *Honey of roſes.*

Take of roſe-buds, freed from the heels, and haſtily dried, four ounces; boiling water, three pints; clarified honey, five pounds. Steep the roſes in the water for ſome hours: then ſtrain off the liquor, mix with it the honey, and boil the mixture to the conſiſtence of honey.

This preparation is not unfrequently made uſe of, as a mild cooling detergent, particularly in gargariſms for ulcerations and inflammation of the mouth and tonſils. The deſign of haſtily drying the roſes, is that they may the better preſerve their aſtringency.

502. *Solutive honey.* L

Take the liquor remaining after the diſtillation of ſix pounds of damaſk-roſes; cummin ſeeds, bruiſed a little, one ounce; brown ſugar, four pounds; honey, two pounds. Having preſſed out the liquor, boil it to three pints; adding towards the end, the ſeeds tied up in a linen cloth. Then put in the ſugar and honey, and boil down the mixture to the conſiſtence of thin honey.

This compoſition is very well contrived for the purpoſe expreſſed in its title. It is principally employed in laxative glyſters; and hence brown ſugar is here allowed; whilſt, for all other uſes, the double-refined is directed.

503. *Oxymel of garlic.* L.

Take of garlic, cut in ſlices, an ounce and a half; caraway ſeeds, ſweet fennel ſeeds, each two drams; clarified honey, ten ounces by weight; vinegar, half a pint. Boil the vinegar, for a little time, with the ſeeds bruiſed, in a glazed earthen veſſel; then add the garlic, and cover the veſſel cloſe; when grown cold, preſs out the liquor, and diſſolve in it the honey by the heat of a water-bath.

This oxymel is recommended for attenuating viſcid juices, promoting expectoration, and the fluid ſecretions in general. It is doubtleſs a medicine of conſiderable efficacy, though very unpleaſant, the flavour of the garlic prevailing, notwithſtanding the addition of the aromatic ſeeds.

504. *Pectoral oxymel.*

Take of elecampane roots, one ounce; Florence orris roots, half an ounce; gum ammoniacum, one ounce; vinegar, half a pint; clarified honey, one pound; water, three pints. Let the roots, cut and bruiſed, be boiled in the water till one-third is waſted: then ſtrain off the liquor; let it ſtand to ſettle; and having poured it off clear from the feces, add to it the honey, and the ammoniacum, previouſly diſſolved in the vinegar. Mix them together, by boiling them a little.

This compoſition is deſigned for thoſe diſorders of the breaſt that proceed from a load of viſcid phlegm (which this medicine attenuates and promotes the expectoration of) and obſtructions of the pulmonary veſſels. Two or three ſpoonfuls may be taken every night and morning, and continued for ſome time.

505. *Oxymel of ſquills.* L.

Take of clarified honey, three pounds; vinegar of ſquills, two pints. Boil them in a glazed earthen veſſel, over a gentle fire, to the conſiſtence of a ſyrup.

This is an uſeful aperient, detergent, and expectorant, and of great ſervice in humoural aſthmas, coughs, and other diſorders, where thick phlegm abounds. It is given in doſes of two or three drams, along with ſome aromatic water, as that of cinnamon, to prevent the great nauſea which it would otherwiſe be apt to excite. In large doſes, it proves emetic.

506. *Simple oxymel.* L.

Take of clarified honey, two pounds; vinegar, one pint. Boil them to a due conſiſtence.

This ſimple preparation is not inferior in efficacy to many more elaborate compoſitions. It is an agreeable, mild, cooling, ſaponaceous, detergent, and attenuating medicine. It is often uſed in cooling detergent gargariſms, and not unfrequently as an expectorant.

507. The boiling of oxymels in glazed earthen veſſels, is not free from danger. Their glazing is procured by a vitrification of lead; and vinegar, by a boiling heat, may corrode ſo much ſo much of vitrified lead, as to receive from it noxious qualities.

SECT. V. *Separation and collection of thoſe parts of Vegetable and Animal ſubſtances which are volatile in the heat of boiling water.*

508. THERE are many vegetable, and ſome animal ſubſtances, whoſe virtues reſide, wholly or in part, in a matter which is capable of totally exhaling in the heat of boiling water. In moſt of the proceſſes hitherto deſcribed it is endeavoured, if poſſible, to preſerve this volatile matter along with the more fixed parts; whether thoſe fixed parts were themſelves medicinal, or only ſubſervient to the union of the volatile matter with the fluids employed. The aim, in the preſent ſection, is, to completely ſeparate this volatile ſubtile principle, and collect it pure from the groſſer fixed parts, either in a concentrated ſtate, or diluted with water or ſpirit of wine. In its concentrated ſtate, it appears commonly an oil; which, from its containing always the ſpecific odour, and frequently the other medicinal powers of the ſubject, is called *eſſential oil.*

§ 1. ESSENTIAL OILS.

509. THESE are drawn by diſtillation in an alembic, with a large refrigeratory. A quantity of water is added to the ſubject, ſufficient to prevent its burning; and in this water it is likewiſe macerated a little time before the diſtillation. The oil comes over along with the water; and either ſwims on its ſurface, or ſinks to the bottom, according as it is lighter or heavier than that fluid. *L.*

510. Eſſential oils are obtained only from odoriferous ſubſtances; but not equally from all of this claſs, nor in quantity proportionable to their degree of odour; ſome, which if we were to reaſon from analogy ſhould ſeem very well fitted for this proceſs, yielding extremely little oil, and others none at all. Roſes and camomile flowers, whoſe ſtrong and laſting ſmell promiſes abundance, are found upon experiment to contain but a ſmall quantity: the violet and jaſmine flowers, which perfume the air with their odour, loſe their ſmell upon the gentleſt coction, and do not afford the leaſt perceptible mark of oil upon being diſtilled, unleſs immenſe quantities are ſubmitted to the operation at once: while ſavin, whoſe diſagreeable ſcent extends to no great diſtance, gives out the moſt oil of almoſt any vegetable known.

Nor are the ſame plants equally fit for this operation, when produced in different ſoils or ſeaſons, or at different times of their growth. Some yield more oil if gathered when the flowers begin to fall off than at any other time; lavender and rue, for inſtance. Others, as ſage, afford the largeſt quantity when young, before they have ſent forth any flowers: and others, as thyme, when the flowers have juſt appeared. All fragrant herbs yield a larger proportion of oil when produced in dry ſoils and warm ſummers, than in the oppoſite circumſtances. On the other hand, ſome of the diſagreeable ſtrong-ſcented ones, as wormwood,

wood, are ſaid to contain moſt in rainy ſeaſons and moiſt rich grounds.

511. With regard to the proportion of water, if whole plants, moderately dried, are uſed, or the ſhavings of woods; as much of either may be put into the veſſel, as, lightly preſſed, will occupy half its cavity; and as much water may be added, as will ariſe up to two thirds its height. The water and ingredients, all together, ſhould never take up more than three-fourths of the ſtill; there ſhould be liquor enough to prevent any danger of an empyreuma, but not ſo much as to be too apt to boil over into the receiver.

The maceration ſhould be continued ſo long, as that the water may fully penetrate the pores of the ſubject. To promote this effect, woods ſhould be thinly ſhaved acroſs the grain, roots cut tranſverſely into thin ſlices, barks reduced into coarſe powder, and ſeeds lightly bruiſed. Very compact and tenacious ſubſtances require the maceration to be continued a week or two, or longer; for thoſe of a ſofter and looſer texture, two or three days are ſufficient; whilſt ſome tender herbs and flowers not only ſtand not in need of any at all, but are even injured by it.

512. The choice of proper inſtruments is of great conſequence to the performance of this proceſs to advantage. There are ſome oils, which paſs freely over the ſwan-neck of the head of the common ſtill: others, leſs volatile, cannot eaſily be made to riſe ſo high. For obtaining theſe laſt Dr Lewis recommends a large low head, having a rim or hollow canal round it; in this canal the oil is detained on its firſt aſcent (and thence conveyed at once into the receiver), the advantages of which are ſufficiently obvious.

With regard to the fire, the operator ought to be expeditious in raiſing it at firſt, and to keep it up, during the whole proceſs, of ſuch a degree, that the oil may freely diſtil; otherwiſe, the oil will be expoſed to an unneceſſary heat, a circumſtance which ought as much as poſſible to be avoided. Fire communicates to all theſe oils a diſagreeable impreſſion, as is evident from their being much leſs grateful when newly diſtilled, than after they have ſtood for ſome time in a cool place; the longer the heat is continued, the more alteration it muſt produce in them.

The greater number of oils require for their diſtillation the heat of water ſtrongly boiling: but there are many alſo which riſe with a conſiderably leſs heat; ſuch as thoſe of lemon-peel, citron-peel, of the flowers of lavender and roſemary, and of almoſt all the more odoriferous kinds of flowers. We have already obſerved, that theſe flowers have their fragrance greatly injured, or even deſtroyed, by beating or bruiſing them: it is impaired alſo by the immerſion in water in the preſent proceſs, and the more ſo in proportion to the continuance of the immerſion and the heat: hence theſe oils, diſtilled in the common manner, prove much leſs agreeable in ſmell than the ſubjects themſelves. For the diſtillation of ſubſtances of this claſs, another method has been contrived: inſtead of being immerſed in water they are expoſed only to its vapour. A proper quantity of water being put into the bottom of the ſtill, the odoriferous herbs or flowers are laid lightly in a baſket, of ſuch a ſize, that it may enter into the ſtill, and reſt againſt its ſides, juſt above the water. The head being then fitted on, and the water made to boil, the ſteam, percolating through the ſubject, imbibes the oil, without impairing its fragrance, and carries it over into the receiver. Oils thus obtained poſſeſs the odour of the ſubject in an exquiſite degree, and have nothing of the diſagreeable ſcent perceivable in thoſe diſtilled by boiling them in water in the common manner.

The water employed in the diſtillation of eſſential oils, always imbibes ſome portion of the oil; as is evident from the ſmell, taſte, and colour, which it acquires. It cannot, however, retain above a certain quantity; and therefore, ſuch as has been already uſed and almoſt ſaturated itſelf, may be advantageouſly employed, inſtead of common water, in a ſecond, third, or any future diſtillation of the ſame ſubject.

After the diſtillation of one oil, particular care ſhould be had to duly cleanſe the worm before it is employed in the diſtillation of a different plant. Some oils, thoſe of wormwood and aniſeeds for inſtance, adhere to it ſo tenaciouſly, as not to be melted out by heat, or waſhed off by water: the beſt way of cleanſing the worm from theſe, is to run a little ſpirit of wine through it.

513. Eſſential oils, after they are diſtilled, ſhould be ſuffered to ſtand for ſome days in veſſels looſely covered with paper, till they have loſt their diſagreeable fiery odour and become limpid: then put them up in ſmall bottles, which are to be kept quite full, cloſely ſtoped, in a cool place: with theſe cautions, they will retain their virtues in perfection for many years.

When careleſsly kept, they in time gradually loſe of their flavour, and become groſs and thick. Some endeavour to recover them again after they have undergone this change, by grinding them with about thrice their weight of common ſalt, then adding a large proportion of water, and diſtilling them afreſh: the purer part ariſes thin and limpid, poſſeſſing a great degree of the priſtine ſmell and taſte of the oils, though inferior in both reſpects to what the oil was at firſt. The oils, when thus altered, are nearly in the ſame ſtate with the turpentines, and other thickened oily juices, which readily yield their purer oil in diſtillation with water alone.

514. Eſſential oils, medically conſidered, agree in the general qualities of pungency and heat; in particular virtues, they differ as much as the ſubjects from which they are obtained, the oil being the direct principle in which the virtues, or part of the virtues, of the ſeveral ſubjects reſide. Thus the carminative virtue of the warm ſeeds, the diuretic of juniper-berries, the emmenagogue of ſavin, the nervine of roſemary, the ſtomachic of mint, the antiſcorbutic of ſcurvy-graſs, the cordial of aromatics, &c. are concentrated in their oils.

There is another remarkable difference in eſſential oils, the foundation of which is leſs obvious; that of the degree of their pungency and heat; which are by no means in proportion, as might be expected, to thoſe of the ſubjects they were drawn from. The oil of cinnamon, for inſtance, is exceſſively pungent and fiery; in its undiluted ſtate, it is almoſt cauſtic: whereas cloves, a ſpice which in ſubſtance is far more pungent than the other, yields an oil which is far leſs ſo.

This difference ſeems to depend partly upon the quantity of oil afforded, cinnamon yielding much leſs than cloves, and conſequently having its active matter concentrated into a ſmaller volume; partly, upon a difference in the nature of the active parts themſelves: for though eſſential oils contain always the ſpecific odour and flavour of their ſubjects, whether grateful or ungrateful, they do not always contain the whole pungency; this reſides frequently in a more fixed reſinous matter, and does not riſe with the oil. After the diſtillation of cloves, pepper, and ſome other ſpices, a part of their pungency is found to remain behind: a ſimple tincture of them in rectified ſpirit of wine is even more pungent than their pure eſſential oils.

415. The more grateful oils are frequently made uſe of for reconciling to the ſtomach medicines of themſelves diſguſtful. It has been cuſtomary to employ them as correctors for the reſinous purgatives; an uſe which they do not ſeem to be well adapted to. All the ſervice they can here be of, is to make the reſin ſit eaſier at firſt on the ſtomach; far from abating the irritating quality upon which the virulence of its operation depends, theſe pungent oils ſuperadd a freſh ſtimulus.

Eſſential oils are never given alone, on account of their extreme heat and pungency; which in ſome is ſo great, that a ſingle drop let fall upon the tongue, produces a gangrenous eſchar. They are readily imbibed by pure dry ſugar, and in this form may be conveniently exhibited. Ground with eight or ten times their weight of the ſugar, they become ſoluble in aqueous liquors, and thus may be diluted to any aſſigned degree. Mucilages alſo render them miſcible with water into an uniform milky liquor. They diſſolve likewiſe in ſpirit of wine; the more fragrant in an equal weight, and almoſt all of them in leſs than four times their own quantity: theſe ſolutions may be either taken on ſugar, or mixed with ſyrups or the like; on mixing them with water, the liquor grows milky, and the oil ſeparates.

The more pungent oils are employed externally againſt paralytic complaints, numbneſs, pains, and aches, cold tumours, and in other caſes where particular parts require to be heated or ſtimulated. The toothach is ſometimes relieved by a drop of theſe almoſt cauſtic oils, received on cotton, and cautiouſly introduced into the hollow tooth.

516. *Eſſential oil of the leaves of wormwood.* L.

This is one of the more ungrateful oils: it ſmells ſtrongly of the wormwood; and contains its particular nauſeous taſte, but has little or nothing of its bitterneſs, this remaining entire in the decoction left after the diſtillation: its colour, when drawn from the freſh herb, is a dark green; from the dry, a browniſh yellow. This oil is employed chiefly as a vermifuge; and for this purpoſe is both applied externally to the belly, and taken internally: it is moſt conveniently exhibited in the form of pills, which it may be reduced into by mixing it with crumb of bread.

517. *Eſſential oil of dill-ſeeds.* L. E.

This is a very warm oil; of a flavour not very agreeable, leſs ſo than that of the ſeeds. It is ſometimes given as a carminative, in flatulencies, colicky pains, hiccups, and the like, from one to three or four drops.

518. *Eſſential oil of aniſeeds.* L. E.

This oil poſſeſſes the taſte and ſmell of the aniſeeds in perfection. It is one of the mildeſt of the diſtilled oils: 15 or 20 drops may be taken at a time without danger, though common practice rarely goes ſo far as half this number. Its ſmell is extremely durable and diffuſive: milk drawn from the breaſt after taking it, is found impregnated with its odour; and poſſibly this may be, in part, the foundation of the pectoral virtues uſually aſcribed to it: in flatulencies and colics, it is ſaid by ſome to be leſs effectual than the ſeeds themſelves.

It is remarkable of this oil, that it congeals, even when the air is not ſenſibly cold, into a butyraceous conſiſtence: and hence, in the diſtillation of it, the operator ought not to be over-ſolicitous in keeping the water in the refrigeratory too cool: it behoves him rather to let it grow ſomewhat hot, particularly towards the end of the proceſs; otherwiſe the oil, congealing, may ſo ſtop up the worm, as to endanger blowing off the head of the ſtill, at leaſt a conſiderable quantity of oil will remain in it.

519. *Eſſential oil of caraway ſeeds.* L. E.

This is a very hot and pungent oil; a ſingle drop is a moderate doſe, and five or ſix a very large one. It is not unfrequently made uſe of as a carminative; and ſuppoſed by ſome to be peculiarly ſerviceable for promoting urine, to which it communicates ſome degree of its ſmell.

520. *Eſſential oil of cloves.* L. E.

This oil is ſo ponderous as to ſink in water, and is not eaſily elevated in diſtillation: if the water which comes over be returned on the remaining cloves, and the diſtillation repeated, ſome more oil will generally be obtained, though much inferior in quality to the firſt. The oil of cloves is uſually deſcribed as being "in taſte exceſſively hot and fiery, and of a gold yellow colour;" (*Boerh. proceſſ.* 27.) Such indeed is the compoſition which we receive under this name from Holland; but the genuine oil of cloves is one of the milder oils: it may be taken with great ſafety (duly diluted) to the quantity of 10 or 12 drops or more. Nor is its colour at all yellow, unleſs it has been long and careleſsly kept, or diſtilled by too violent a fire: when in perfection, it is limpid and colourleſs; of a pleaſant, moderately warm and pungent taſte; and of a very agreeable ſmell, much reſembling that of the ſpice itſelf.

521. *Eſſential oil of chamomile flowers.* L.

This is a very pungent oil, of a ſtrong not ungrateful ſmell, reſembling that of the flowers; its colour is yellow, with a caſt of greeniſh or brown. It is ſometimes given in the doſe of a few drops, as a carminative, in hyſteric diſorders, and likewiſe as a vermifuge; it may be conveniently made into pills with crumb of bread.

422. *Oil of cinnamon.* L.

This valuable oil is extremely hot and pungent; of a moſt agreeable flavour, like that of the cinnamon itſelf. In cold languid caſes, and debilities of the nervous ſyſtem, it is one of the moſt immediate cordials and reſtoratives. The doſe is one, two, or three drops; which muſt always be carefully diluted by the mediation of ſugar, &c. for ſo great is the pungency of this oil, that a ſingle drop let fall upon the tongue, undiluted, produces, as Boerhaave obſerves, a gangrenous eſchar. In the diſtillation of this oil, a ſmart fire is required; and the low head, with a channel round it, above recommended for the diſtillation of the leſs volatile oils (n° 512.), is particularly neceſſary for this, which is one of the leaſt volatile, and which is afforded by the ſpice in exceeding ſmall quantity.

523. *Eſſential oil of fennel-ſeeds.*

The oil obtained from ſweet-fennel ſeeds is much more elegant and agreeable than that of the common fennel. It is one of the mildeſt of theſe preparations: it is nearly of the ſame degree of warmth with that of aniſeeds; to which it is likewiſe ſimilar in flavour, tho' far more grateful. It is given from two or three drops to 10 or 12, as a carminative, in cold indiſpoſitions of the ſtomach; and in ſome kinds of coughs, for promoting expectoration.

524. *Eſſential oil of juniper-berries.* L. E.

This oil is a very warm and pungent one; of a ſtrong flavour, not unlike that of the berries. In the doſe of a drop or two, it proves a ſerviceable carminative and ſtomachic; in one of ſix, eight, or more, a ſtimulating, detergent diuretic and emmenagogue: it ſeems to have ſomewhat of the nature of the turpentines, or their diſtilled oil; like which it communicates a violent ſmell to the urine.

The oil of theſe berries reſides partly in veſicles ſpread through the ſubſtance of the fruit, and partly in little cells contained in the ſeeds; when the berry is dry, and the oil hardened into a reſinous ſubſtance, it becomes viſible, upon breaking the ſeeds, in form of little tranſparent drops. In order therefore to obtain this oil to advantage, we ought, previous to the diſtillation, to bruiſe the berry thoroughly, ſo as to break the ſeeds, and entirely lay open the oily receptacles.

525. *Eſſential oil of lavender-flowers.* L. E.

This oil, when in perfection, is very limpid, of a pleaſant yellowiſh colour, extremely fragrant, poſſeſſing in an eminent degree the peculiar ſmell generally admired in the flowers. It is a medicine of great uſe, both externally and internally, in paralytic and lethargic complaints, rheumatic pains, and debilities of the nervous ſyſtem. The doſe is from one drop to five or ſix.

526. *Eſſential oil of bay-berries.*

The oil of bay-berries is thin and limpid, moderately pungent, of a ſtrong and tolerably grateful ſmell. It is given in flatulent colics, hyſteric complaints, and for allaying the pains conſequent upon delivery; the doſe from two drops to five or ſix. It is likewiſe made an ingredient in carminative glyſters; and in ſome hyſteric caſes, is applied externally.

526. *Eſſence of lemons.* L.

This is a pleaſant oil, of a fine ſmell, very near as agreeable as that of the freſh peel: it is one of the lighteſt and moſt volatile oils we have, perfectly limpid, and almoſt colourleſs. It is taken in doſes of two or three drops, as a cordial, in weakneſs of the ſtomach, &c. though more frequently uſed as a perfume.

528. *Eſſential oil of mace.*

The eſſential oil of mace is moderately pungent, very ſubtle and volatile, and of a ſtrong aromatic ſmell like that of the ſpice itſelf: it is thin and limpid, of a pale yellowiſh colour, with a portion of thicker and darker-coloured oil at the bottom. This oil is celebrated in vomitings, hickups, colicky pains, &c. both given internally from one to four drops, and applied externally to the ſtomach and umbilical region. It is, however, but rarely made uſe of, and not often met with in the ſhops.

529. *Eſſential oil of marjoram leaves.* L.

This oil is very hot and penetrating, in flavour not near ſo agreeable as the marjoram itſelf: when in perfection, it is of a pale yellow colour; by long keeping, it turns reddiſh: if diſtilled with too great a heat, it ariſes of this colour at firſt. It is ſuppoſed to be peculiarly ſerviceable in relaxations, obſtructions, and mucous diſcharges of the uterus: the doſe is one or two drops.

530, a. *Eſſential oil of the leaves of common mint.* L. E.

This oil ſmells and taſtes ſtrongly of the mint, but is in both reſpects ſomewhat leſs agreeable than the herb itſelf. It is an uſeful ſtomachic medicine; and not unfrequently exhibited in want of appetite, weakneſs of the ſtomach, retchings to vomit, and other like diſorders, when not accompanied with heat or inflammation: two or three drops, or more, are given for a doſe.

530, b. *Eſſential oil of the leaves of pepper-mint.* L.

This poſſeſſes the ſmell, taſte, and virtues of the pepper-mint in perfection; the colour is a pale greeniſh yellow. It is a medicine of great pungency and ſubtlety; and diffuſes, almoſt as ſoon as taken, a glowing warmth through the whole ſyſtem. In colics accompanied with great coldneſs, and in ſome hyſteric complaints, it is of excellent ſervice. A drop or two are in general a ſufficient doſe.

331. *Eſſential oil of nutmegs.* L. E.

The eſſential oil of nutmegs poſſeſſes the flavour and aromatic virtues of the ſpice in an eminent degree. It is ſimilar in quality to the oil of mace, but ſomewhat leſs grateful.

532. *Eſſential oil of the leaves of origanum.* L. E.

This oil has a very pungent acrimonious taſte, and a penetrating ſmell. It has been chiefly employed externally as an errhine, and for eaſing pains of the teeth.

533. *Eſſential oil of Jamaica pepper.* E.

This is a very elegant oil, and may be uſed as a ſuccedaneum to thoſe of ſome of the dearer ſpices. It is of a fine pale colour, in flavour more agreeable than the oil of cloves, and not far ſhort of that of nutmegs. It ſinks in water, like the oils of ſome of the eaſtern ſpices.

534. *Eſſential oil of roſemary.* L. E.

The oil of roſemary is drawn from the plant in flower. When in perfection, it is very light and thin; pale, and almoſt colourleſs; of great fragrancy, tho' not quite ſo agreeable as the roſemary itſelf. It is recommended, in the doſe of a few drops, in nervous and hyſteric complaints. Boerhaave holds it in great eſteem againſt epilepſies, and ſuppreſſions of the uterine purgations, occaſioned by weakneſs and inactivity.

535. *Eſſential oil of rue-leaves.* L.

The oil of rue has a very acrid taſte, and a penetrating ſmell, reſembling that of the herb, but rather more unpleaſant. It is ſometimes made uſe of in hyſteric diſorders, and as an anthelmintic; as alſo in epilepſies proceeding from a relaxed ſtate of the nerves.

Rue yields its oil very ſparingly. The largeſt quantity is obtained from it when the flowers are ready to fall off, and the ſeeds begin to ſhow themſelves: ſuitable maceration, previous to the diſtillation, is here extremely neceſſary.

536. *Eſſential oil of ſavin leaves.* L. E.

This oil is a celebrated uterine and emmenagogue; in cold phlegmatic habits, it is undoubtedly a medicine of good ſervice, though not capable of performing what it has been uſually repreſented to do. The doſe is, two or three drops or more.

537. *Eſſential oil of ſaſſafras.* L. E.

This is the moſt ponderous of all the known eſſential oils, but riſes in diſtillation with ſufficient eaſe: it appears limpid as water, has a moderately pungent taſte, a very fragrant ſmell, exactly reſembling that of the ſaſſafras. It ſtands greatly commended as a ſudorific, and for purifying the blood and juices: it is likewiſe ſuppoſed to be of ſervice in humoural aſthmas and coughs. The doſe is from one drop to eight or ten; though Geoffroy goes as far as 20.

The decoction remaining after the diſtillation of the oil, affords, by inſpiſſation, an uſeful extract, of a mild, bitteriſh, ſubaſtringent taſte. Hoffman ſays, he has given it with great benefit, in doſes of a ſcruple, as a corroborant in cachectic caſes, in the decline of intermitting fevers, and for abating hypochondriacal ſpaſms.

538. *Oil of turpentine.* L. E.

This is diſtilled in the ſame manner as the foregoing oils, and is ſtrictly an eſſential one, though not uſually ranked in this claſs: it is commonly, but improperly, called *ſpirit of turpentine.* It is employed in large quantities for ſome mechanic purpoſes, and hence the diſtillation of it is become a particular buſineſs.

This oil is a very hot, ſtimulating medicine. It is ſometimes given as a ſudorific and diuretic, in the doſe of two or three drops: in larger doſes, it is apt to greatly heat the body, occaſion pain of the head, an effuſion of the ſemen and liquor of the proſtate glands. It has nevertheleſs been of late taken in conſiderable doſes (along with honey or other convenient vehicles) againſt the ſciatica; and, as is ſaid, with good ſucceſs. Some have recommended it againſt venereal runnings: but here it has produced miſchievous conſequences, inflaming the parts and aggravating the diſorder. Externally it is not unfrequently employed againſt rheumatic pains, aches, ſprains, for diſcuſſing cold tumours, and reſtraining hæmorrhages.

539. After the diſtillation of the turpentine, there remains in the ſtill a brittle reſinous ſubſtance, of a yellow colour, called *yellow reſin* [L.]

The only uſe of this is in external applications, for giving conſiſtence to plaſters, and the like purpoſes.

540. Moſt of the foregoing oils are drawn by our chemiſts, and eaſily procurable in a tolerable degree of perfection; thoſe of cinnamon, cloves, nutmegs, and mace, excepted. Theſe are uſually imported from abroad; and are for the moſt part ſo much adulturated, that it is difficult to meet with ſuch as are at all fit for uſe.

Nor are the adulterations of theſe kinds of preparations eaſily diſcoverable. The groſſer abuſes indeed may be readily detected: thus if the oil is mixed with ſpirit of wine, it will turn milky on the addition of water; if with expreſſed oils, rectified ſpirit will diſſolve the eſſential, and leave the other behind; if with oil of turpentine, on dipping a piece of paper in the mixture, and drying it with a gentle heat, the turpentine will be betrayed by its ſmell. But the more ſubtle artiſts have contrived other methods of ſophiſtication, which elude all trials of this kind.

Some have looked upon the ſpecific gravity of oils, as a certain criterion of their genuineneſs. This, however, is not to be abſolutely depended on; for the genuine oils, obtained from the ſame ſubject, oftentimes differ in gravity as much as thoſe drawn from different ones. Cinnamon and cloves, whoſe oils uſually ſink in water, yield, if ſlowly and warily diſtilled, an oil of great fragrancy, which is nevertheleſs ſpecifically lighter than the aqueous fluid employed in the diſtillation of it; whilſt, on the other hand, the laſt runnings of ſome of the lighter oils prove ſometimes ſo ponderous as to ſink in water.

As all eſſential oils agree in the general properties of ſolubility in ſpirit of wine, indiſſolubility in water, miſcibility with water by the intervention of certain intermedia, volatility in the heat of boiling water, &c. it is plain that they may be variouſly mixed with one another, or the dearer ſophiſticated with the cheaper, without any poſſibility of diſcovering the abuſe by any trials of this kind. And indeed, it would not be of much advantage to the purchaſer if he had infallible criteria of the genuineneſs of every individual oil. It is of as much importance, that they may be *good*, as that they may be *genuine*; for we have often ſeen genuine oils, from incautious diſtillation, and long and careleſs keeping, weaker both in ſmell and taſte than the common ſophiſticated ones.

The ſmell and taſte ſeem to be the only certain teſts that the nature of the thing will admit of. If a bark ſhould have in every reſpect the appearance of good cinnamon, and ſhould be proved indiſputably to be the genuine bark of the cinnamon tree; yet, if it wants the cinnamon flavour, or has it but in a low degree, we reject it: and the caſe is the ſame with the oil. It is only from uſe and habit, or compariſon with ſpecimens of known quality, that we can judge of the goodneſs, either of the drugs themſelves, or of their oils.

Moſt of the eſſential oils, indeed, are too hot and pungent to be taſted with ſafety; and the ſmell of the ſubject is ſo much concentrated in them, that a ſmall variation in this reſpect is not eaſily diſtinguiſhed. But we can readily dilute them to any aſſignable degree. A drop of the oil may be diſſolved in ſpirit of wine; or received on a bit of ſugar, and diſſolved by that intermedium in water. The quantity of liquor which it thus impregnates with its flavour, or the degree of flavour which it communicates to a certain determinate quantity, will be the meaſure of the degree of goodneſs of the oil.

§ 2. *SIMPLE* DISTILLED WATERS.

541. The effluvia which exhale in the air from many vegetables, particularly from thoſe of the odorous kind, conſiſt apparently of principles of great ſubtlety and activity, capable of ſtrongly and ſuddenly affecting the brain and nervous ſyſtem, eſpecially in thoſe whoſe nerves are of great ſenſibility; and likewiſe of operating, in a ſlower manner, upon the ſyſtem of groſſer veſſels. Thus Boerhaave obſerves, that, in hyſterical and dropſical perſons, the fragrant odour of the Indian hyacinth excites ſtrange ſpaſms, which the ſtrong ſcent of rue relieves; that the effluvia of the walnut-tree occaſion head-achs, and make the body coſtive; that thoſe of poppies procure ſleep; and that the ſmell of bean-bloſſoms, long continued, diſorders the ſenſes. Lemery relates, from his own knowledge, that ſeveral perſons were purged, by ſtaying long in a room where damaſk-roſes were drying.

Some of the chemiſts have indulged themſelves in the pleaſing ſurvey of theſe *preſiding ſpirits*, as they are called, of vegetables; their peculiar nature in the different ſpecies of plants; their exhalation into the atmoſphere by the ſun's heat, and diſperſion by winds; their rendering the air of particular places medicinal, or otherwiſe, according to the nature of the plants that abound. They have contrived alſo different means for collecting theſe fugitive emanations, and concentrating and condenſing them into a liquid form; employing either the native moiſture of the ſubject, or an addition of water, as a vehicle or matrix for retaining them.

542. The proceſs which has been judged moſt analogous to that of nature is the following: The ſubject, freſh gathered at the ſeaſon of its greateſt vigour, with the morning-dew upon it, is laid lightly and unbruiſed in a ſhallow veſſel, to which is adapted a low head with a recipient: under the veſſel a live coal is placed, and occaſionally renewed, ſo as to keep up an uniform heat, no greater than that which obtains in the atmoſphere in ſummer, viz. about 85 degrees of Fahrenheit's thermometer. In this degree of heat, there ariſes, exceedingly ſlowly, an inviſible vapour, which condenſes in the head into dewy drops, and falls down into the receiver, and which has been ſuppoſed to be the very ſubſtance that the plant would have ſpontaneouſly emitted in the open air.

But on ſubmitting to this proceſs many kinds of odoriferous vegetables, liquors obtained by it have been always found to be very different from the natural effluvia of the reſpective ſubjects: they had very little ſmell, and no remarkable taſte. It appeared, that a heat, equal to that of the atmoſphere, is incapable of raiſing in cloſe veſſels thoſe parts of vegetables which they emit in the open air. It may therefore be preſumed, that in this laſt caſe ſome other cauſe concurs to the effect: that it is not the ſun's heat alone which raiſes and impregnates the air with the odorous principles of vegetables; but that the air itſelf, or the watery humidity with which it abounds, acting as a true diſſolvent, extracts and imbibes them; ſo that the natural effluvia of the plant may be looked upon as an infuſion of the plant made in air. The purgative virtue of the damaſk-roſe, and the aſtringency of the walnut-tree, which, as above obſerved, are in ſome meaſure communicated to the air, may be totally extracted by infuſion both in watery and ſpirituous menſtrua, but never riſe in diſtillation with any degree of heat: and the volatile odours of aromatic herbs, which are diffuſed through the atmoſphere in the loweſt warmth, cannot be made to diſtil without a heat much greater than is ever found to obtain in a ſhaded air.

The above proceſs therefore, and the theory on which it is built, appear to be faulty in two points: (1.) In ſuppoſing, that all thoſe principles which naturally exhale from vegetables, may be collected by diſtillation; whereas there are many which the air extracts in virtue of its diſſolving power, and which are artificially ſeparable alſo by diſſolvents only: (2.) In employing a degree of heat inſufficient for ſeparating even thoſe parts which are truly exhaleable by heat.

643. The foregoing method of diſtillation is commonly called *diſtillation by the cold ſtill*; but thoſe who have practiſed it, have generally employed a conſiderable heat. A ſhallow leaden veſſel is filled with the freſh herbs, flowers, &c. which are heaped above it, ſo that, when the head is fitted on, this alſo may be filled a conſiderable way: a little fire is made under the veſſel, ſufficient to make the bottom much hotter than the hand can bear, care being taken only not to heat it ſo far as to endanger ſcorching any part of the ſubject. If the bottom of the veſſel is not made ſo hot as to have this effect on the part contiguous to it, it is not to be feared that the heat communicated to the reſt of the included matter will be great enough to do it any injury. By this management, the volatile parts of ſeveral odorous plants, as mint, are effectually forced over; and if the proceſs has been ſkilfully managed, the diſtilled liquor proves richly impregnated with the native odour and flavour of the ſubject, without having received any kind of diſagreeable impreſſion from the heat made uſe of.

This proceſs has been chiefly practiſed in private families; the ſlowneſs of the diſtillation, and the attendance and care neceſſary for preventing the ſcorching of ſome part of the plant ſo as to communicate an ungrateful burnt flavour to the liquor, rendering it inconſiſtent with the diſpatch requiſite in the larger way of buſineſs.

544. Another method has therefore been had recourſe to; that by the common ſtill, called, in diſtinction from the foregoing, the *hot* ſtill. Here a quantity of water is added to the plant, to prevent its burning: and the liquor is kept nearly of a boiling heat, or made fully to boil, ſo that the vapour riſes plentifully into the head, and paſſing thence into a ſpiral pipe

or worm, placed in a veſſel of cold water, is there condenſed, and runs out into drops quickly ſucceeding one another, or in a continued ſtream. The additional water does not at all weaken the produce: for the moſt volatile parts of the ſubject riſe firſt, and impregnate the liquor that firſt diſtils: as ſoon as the plant has given over its virtue ſufficiently, which is known by examining from time to time the liquor that runs from the noſe of the worm, the diſtillation is to be ſtopped.

This is the method of diſtillation commonly practiſed for the officinal waters. It is accompanied with one imperfection, affecting chiefly thoſe waters whoſe principal value conſiſts in the delicacy of their flavour; this being not a little injured by the boiling heat uſually employed, and by the coagitation of the odorous particles of the ſubject with the water. Sometimes alſo a part of the plant ſticks to the ſides of the ſtill, and is ſo far ſcorched as to give an ungrateful taint to the liquor.

545. There is another method of managing this operation, which we have already recommended for the diſtillation of the more volatile eſſential oils, and which is equally applicable to that of the waters. In this method, the advantages of the foregoing ones are united, and their inconveniences obviated. A quantity of water being poured into the ſtill, and the herbs or flowers placed in a baſket over it, there can be no poſſibility of burning; the water may be made to boil, but ſo as not to riſe up into the baſket, which would defeat the intention of this contrivance. The hot vapour of the water paſſing lightly through all the interſtices of the ſubject matter, imbibes and carries out the volatile parts unaltered in their native flavour. By this means the diſtilled waters of all thoſe ſubſtances, whoſe oils are of the more volatile kind, are obtained in the utmoſt perfection, and with ſufficient diſpatch; for which laſt intention the ſtill may be filled quite up to the head.

546. In the diſtillation of eſſential oils, the water, as obſerved in the foregoing ſection, imbibes always a part of the oil. The diſtilled liquors here treated of, are no other than water thus impregnated with the eſſential oil of the ſubject; whatever ſmell, taſte, or virtue, is here communicated to water, or obtained in the form of a watery liquor, being found in a concentrated ſtate in the oil. The eſſential oil, or ſome part of it, more attenuated and ſubtilized than the reſt, is the direct principle on which the title of *ſpiritus rector*, or preſiding ſpirit, has been beſtowed.

All theſe vegetables therefore which contain an eſſential oil, will give over ſome virtue to water by diſtillation: but the degree of the impregnation of the water, or the quantity of water which a plant is capable of ſatiating with its virtue, are by no means in proportion to the quantity of its oil. The oil ſatiates only the water that comes over at the ſame time with it: if there be more oil than is ſufficient for this ſatiation, the ſurplus ſeparates, and concretes in its proper form, not miſcible with the water that ariſes afterwards. Some odoriferous flowers, whoſe oil is in ſo little quantity, that ſcarcely any viſible mark of it appears, unleſs 50 or 100 pounds or more are diſtilled at once, give nevertheleſs as ſtrong an impregnation to water, as thoſe plants which abound moſt with oil.

547. *General rules for the diſtillation of the officinal ſimple waters.*

I. Plants and their parts ought to be freſh gathered.

Where they are directed freſh, ſuch only muſt be employed; but ſome are allowed to be uſed dry, as being eaſily procurable in this ſtate at all times of the year, though rather more elegant waters might be obtained from them whilſt green [*L.*]

II. Having bruiſed the ſubject a little, pour thereon thrice its quantity of ſpring-water: this quantity is to be diminiſhed or increaſed, according as the plants are more or leſs juicy than ordinary.

When freſh and juicy herbs are to be diſtilled, thrice their weight of water will be fully ſufficient: but dry ones require a much larger quantity. In general, there ſhould be ſo much water, that after all intended to be diſtilled has come over, there may be liquor enough left to prevent the matter from burning to the ſtill.

III. The diſtillation may be performed in an alembic with a refrigeratory, the junctures being luted.

IV. The diſtillation is to be continued as long as the water which comes over is perceived to have any ſmell or taſte of the plant.

Plants differ ſo much, according to the ſoil and ſeaſon of which they are the produce, and likewiſe according to their own age, that it is impoſſible to fix the quantity of water to be drawn from a certain weight of them, to any invariable ſtandard. The diſtillation may always be continued as long as the liquor runs well flavoured of the ſubject, and no longer.

If the herbs are of prime goodneſs, they muſt be taken in the weights preſcribed. But when freſh ones are ſubſtituted to dry, or when the plants themſelves are the produce of unfavourable ſeaſons, and weaker than ordinary, the quantities are to be varied according the diſcretion of the artiſt [*L.*]

After the odorous water, alone intended for uſe, has come over, an acidulous liquor ariſes, which has ſometimes extracted ſo much from the copper-head of the ſtill, as to prove emetic. To this are owing the anthelmintic virtues attributed to certain diſtilled waters.

V. If any drops of oil ſwim on the ſurface of the water, they are to be carefully taken off.

VI That the waters may keep the better, about one-twentieth part their weight of proof-ſpirit may be added to each, after they are diſtilled. *L.*

548. A great number of diſtilled waters were formerly kept in the ſhops, and are ſtill retained in foreign pharmacopœias. The faculty of Paris direct, in the laſt edition of their *codex medicamentarius*, no leſs than 125 different waters, and 130 different ingredients in one ſingle water. Near one half of theſe preparations have ſcarcely any virtue or flavour from the ſubject, and many of the others are inſignificant.

The colleges of London and Edinburgh have rejected theſe oſtentatious ſuperfluities: and given an elegant and compendious ſet of waters, ſufficient for anſwering ſuch purpoſes as theſe kinds of preparations are applied to in practice. Diſtilled waters are employed chiefly as grateful diluents, as ſuitable vehicles for medicines of greater efficacy, or for rendering diſguſtful ones more acceptable to the palate and ſtomach:

mach: few are depended on, in any intentions of conſequence, by themſelves.

549. *Simple alexeterial water.* L.

Take of ſpearmint leaves, freſh, a pound and a half: ſea-wormwood tops freſh, angelica-leaves freſh, each one pound; water, as much as is ſufficient to prevent an empyreuma. Draw off by diſtillation three gallons.

This water is ſufficiently elegant with regard to taſte and ſmell; though few expect from it ſuch virtues as the title ſeems to imply. It is uſed occaſionally for vehicles of alexipharmac medicines, or in juleps to be drank after them, as coinciding with the intention; but in general this water is not ſuppoſed to be itſelf of any conſiderable efficacy.

550. *Simple orange-peel water.* L.

Take of yellow peel of Seville oranges, dried, four ounces; water, as much as is ſufficient to prevent burning. Diſtill off one gallon.

This water proves very weak of the orange-peel. It is deſigned for a diluter, in fevers, and other diſorders where the ſtomach and palate are ſubject to receive quick diſguſt; in which caſes (as the committee obſerve) cordial waters, eſpecially if their uſe is to be long continued, ought to be but lightly impregnated with any flavour, however agreeable.

551. *Black cherry water.*

Let any quantity of black cherries be bruiſed, ſo as the ſtones may be broken; and then diſtilled according to art, with only a ſmall proportion of water.

This is a very grateful water, and has long maintained a place in the ſhops. It has frequently been employed by phyſicians as a vehicle, in preference to the other diſtilled waters; and, among nurſes and others who have the care of young children, has been the firſt remedy againſt the convulſive diſorders to which children are ſo often ſubject.

This water has nevertheleſs of late been brought into diſrepute; being, in conſequence of certain experiments, looked upon by ſome as poiſonous, and by moſt as at leaſt ſuſpicious. Wherefore both the London and Edinburgh colleges have choſen to lay it aſide; more eſpecially as it has been too often counterfeited with a water diſtilled from bitter almonds, which are known to communicate a poiſonous quality.

552, a. *Simple cinnamon-water.* L.

Take of cinnamon, one pound; water, as much as will prevent burning. Diſtil off a gallon.

552, b. *Cinnamon-water without wine.* E.

Take of cinnamon, half a pound; water, one gallon and a half. Steep them together for two days; and then diſtil off one gallon.

This is a very grateful and uſeful water, poſſeſſing in an eminent degree the fragrance and aromatic cordial virtues of the ſpice. Great care ſhould be had, in the choice of the cinnamon, to avoid the too common impoſition of caſia being ſubſtituted in its room: this latter yields a water much leſs agreeable than that of cinnamon, and whoſe flavour is manifeſtly empyreumatic.

The virtues of all theſe waters depend upon their containing a portion of the oil of the ſubject. The oil of cinnamon is very ponderous, and ariſes more difficultly than that of any of the other vegetable matters from which ſimple waters are ordered to be drawn. This obſervation directs us, in the diſtillation of this water, to make uſe of a quick fire, and a low veſſel. For the ſame reaſon, the water does not keep ſo well as might be wiſhed; the ponderous oil parting from it in time, and falling to the bottom, when the liquor loſes its milky hue, its fragrant ſmell and aromatic taſte. Some recommend a ſmall proportion of ſugar to be added, in order to keep the oil united with the water.

553. *Fennel water.* L.

Take of ſweet-fennel ſeeds, one pound; water, as much as is ſufficient to prevent an empyreuma. Diſtil off one gallon.

This water is a ſufficiently grateful one. The leaves ſhould be taken before the plant has run into flower; for after this time, they are much weaker and leſs agreeable. Some have obſerved, that the upper leaves and tops, before the flowers appear, yield a more elegant water, and a remarkably finer eſſential oil, than the lower ones; and that the oil obtained from the one ſwims on water, whilſt that of the other ſinks. No part of the herb, however, is equal in flavour to the ſeeds.

554. *Balm-water.*

This is prepared by diſtilling the green leaves of balm, as in the foregoing proceſs.

In a former edition of the Edinburgh pharmacopœia, this water was ordained to be cohobated, or rediſtilled from freſh quantities of the herb. This management ſeems to have been taken from Boerhaave, who has a very high opinion of the water thus prepared: he ſays, he has experienced in himſelf, extraordinary effects from it, taken on an empty ſtomach; that it has ſcarce its equal in hypochondriacal and hyſterical caſes, the chloroſis, and palpitation of the heart, as often as theſe diſeaſes proceed from a diſorder of the ſpirits rather than from any collection of morbific matter.

But whatever virtues are lodged in balm, they may be much more perfectly and advantageouſly extracted by cold infuſion in aqueous or ſpirituous menſtrua: in this proceſs, the liquor ſuffers no injury from being returned on freſh parcels of the herb; a few repetitions will load it with the virtues of ſubject, and render it very rich. The impregnation here is almoſt unlimited; but in diſtilled waters it is far otherwiſe.

555. *Mint-water.* E.

Take of ſpearmint leaves, freſh, any quantity; water, three times as much. Diſtil as long as the liquor which comes over has any taſte or ſmell of the mint.

556. *Simple ſpearmint-water.* L.

Take of ſpearmint-leaves, dried, a pound and a half; water, as much as is ſufficient to prevent burning. Draw off by diſtillation one gallon.

Theſe waters ſmell and taſte very ſtrong of the mint; and prove in many caſes uſeful ſtomachics. Boerhaave commends them (cohobated) as a preſent and incomparable remedy for ſtrengthing a weak ſtomach, and curing vomiting proceeding from cold viſcous phlegm; as alſo in lienteries.

557. *Simple peppermint-water.* L. E.

Take of peppermint leaves, dry, a pound and a half; water, as much as will prevent an empreuyma. Draw off by diſtillation one gallon.

This is a very elegant and uſeful water; it has a warm, pungent taſte, exactly reſembling that of the peppermint itſelf. A ſpoonful or two, taken at a time, warm the ſtomach, and give great relief in cold, flatulent colics. Some have ſubſtituted a plain infuſion of the dried leaves of the plant, which is not greatly different in virtue from the diſtilled water.

558. *Water of Jamaica pepper.* L.

Take of Jamaica pepper, half a pound; water, as much will prevent burning. Diſtil off one gallon.

This diſtilled water is a very elegant one, and has of late come pretty much into uſe: the hoſpitals employ it as a ſuccedaneum to the more coſtly ſpice-waters. It is, however, inferior in gratefulneſs to the ſpirituous water of the ſame ſpice hereafter directed, (591.).

559, a. *Simple pennyroyal-water.* L.

Take of pennyroyal leaves, dry, a pound and a half; water, as much as will prevent burning. Draw off by diſtillation one gallon.

559. b. *Water of pennyroyal.* E.

Take of pennyroyal leaves, freſh, a pound and a half; water, as much as will prevent burning. Diſtil off a gallon.

This water poſſeſſes, in a conſiderable degree, the ſmell, taſte, and virtues of the pennyroyal. It is frequently taken in hyſteric caſes, and not without good effects.

560. *Damaſk-roſe water.*

Take of damaſk roſes, freſh gathered, ſix pounds; water, as much as will keep them from burning. Diſtill off a gallon of the water. *L.*

Take of roſes, ſix pounds; water, a ſufficient quantity. Diſtil off one gallon. *E.*

This water is principally valued on account of its fine flavour, which approaches to that generally admired in the roſe itſelf. The purgative virtue of the roſes remains entire in the liquor left in the ſtill, which has therefore been generally employed for making the ſolutive honey and ſyrup, inſtead of a decoction or infuſion of freſh roſes prepared on purpoſe: and this piece of frugality the college have now admitted.

561. *Rue-water.*

This is to be diſtilled from the freſh leaves of rue, and cohobated on freſh parcels of them, after the ſame manner as the balm-water, (554.)

Rue gives over in this proceſs the whole of its ſmell, and great part of its pungency. The diſtilled water ſtands recommended in epileptic caſes, the hyſteric paſſion, for promoting perſpiration and other natural ſecretions.

562. *Savin-water.*

Savin leaves, freſh, any quantity; water, three times as much. Diſtil as long as the liquor runs well-flavoured of the plant.

This water is by ſome held in conſiderable eſteem for the ſame purpoſe as the diſtilled oil of ſavin. Boerhaave relates, that he found it (when prepared by cohobation) to give an almoſt incredible motion to the whole nervous ſyſtem; and that, when properly uſed, it proves eminently ſerviceable for promoting the menſes, and the hæmorrhoidal flux.

§ 3. *SPIRITUOUS* DISTILLED WATERS and SPIRITS.

563. The flavour and virtues of the diſtilled waters are owing, as obſerved in the preceding ſection, to their being impregnated with a portion of the eſſential oil of the ſubject from which they are drawn. Spirit of wine, conſidered as a vehicle for theſe oils, has this advantage above water, that it is their proper menſtruum, and keeps all the oil, that riſes from it, perfectly diſſolved into an uniform limpid liquor.

Nevertheleſs, many ſubſtances, which, on being diſtilled with water, impart to it their virtues in great perfection; if treated in the ſame manner with ſpirit of wine, ſcarce give over to it any ſmell or taſte. This difference proceeds from hence; that ſpirit is not ſuſceptible of ſo great a degree of heat as water. Liquids in general, when made to boil, have received as great a heat as they are capable of ſuſtaining: now, if the extent of the heat between freezing and boiling water, as meaſured by thermometers, be taken for a ſtandard, ſpirit of wine will be found to boil with leſs than four-fifths of that heat, or above one-fifth leſs than the heat of boiling water. It is obvious therefore, that ſubſtances may be volatile enough to riſe with the heat of boiling water, but not with that of boiling ſpirit.

Thus if cinnamon, for inſtance, be committed to diſtillation with a mixture of ſpirit of wine and water, or with a pure proof-ſpirit, which is no other than a mixture of about equal parts of the two; the ſpirit will ariſe firſt, clear, colourleſs, and tranſparent, and almoſt without any taſte of the ſpice; but as ſoon as the more ponderous watery fluid begins to ariſe, the oil comes freely over with it, ſo as to render the liquor highly odorous, ſapid, and of a milky hue.

The proof-ſpirits uſually met with in the ſhops are accompanied with a degree of ill flavour; which, tho' concealed by means of certain additions, plainly diſcovers itſelf in diſtillation. This nauſeous reliſh does not begin to ariſe till after the purer ſpirituous part has come over; which is the very time that the virtues of the ingredients begin alſo moſt plentifully to diſtil: and hence the liquor receives an ungrateful taint. To this cauſe principally is owing the general complaint, that the cordials of the apothecary are leſs agreeable than thoſe of the ſame kind prepared by the diſtiller; the latter being extremely curious in rectifying or purifying the ſpirits (when deſigned for what he calls *fine goods*) from all ill flavour.

564. *Rectified ſpirit of wine,*

In the former edition of the Edinburgh pharmacopœia, was thus ordered:

Take any quantity of French brandy, and with a very gentle heat diſtil it to one half.

This rectified ſpirit, being digeſted for two days with one-fourth its quantity of dry ſalt of tartar in powder, and then diſtilled in a glaſs cucurbit, with a very gentle heat, becomes alcohol.

Spirits diſtilled from malt liquors, or other fermented ſubſtances, after being rectified in the above method, require further purification; namely, repeated diſtillation from an equal quantity of ſpring water.

565. French brandy is rather too dear an article in this country, for diſtillation; nor is the ſpirit obtained from it any ways preferable to one procurable from cheaper liquors. The coarſer inflammable ſpirits may be rendered perfectly pure and fit for the niceſt purpoſes, by the following method.

If the ſpirit is exceedingly foul, mix it with about an equal quantity of water, and diſtil with a ſlow fire; diſcontinuing the operation as ſoon as the liquor begins to run milky, and diſcovers, by its nauſeous taſte, that the impure and phlegmatic part is ariſing. By this treatment, the ſpirit leaves a conſiderable portion of its foul oily matter behind it in the water, which now appears milky and turbid, and proves highly diſagreeable in taſte. If the ſpirit was not very foul at firſt, this ablution is not neceſſary; if extremely ſo, it will be needful to repeat it once, twice, or oftener.

566. As vinous ſpirits ariſe with a leſs degree of fire than watery liquors, we are hence directed to employ, in the diſtillation of them, a heat leſs than that in which water boils: and if due regard be had to this circumſtance, very weak ſpirits may, by one or two wary diſtillations, be tolerably well freed from their aqueous phlegm; eſpecially if the diſtilling veſſels are of ſuch a height, that the ſpirit, by the heat of a water-bath, may but juſt paſs over them: in ſuch caſe, the phlegmatic vapours, which ariſe for a little way along with the ſpirit, will condenſe and fall back again before they can come to the head. Very pompous inſtruments have been contrived for this purpoſe, and carried in a ſpiral or ſerpentine form to an extraordinary height. The ſpirit, aſcending through theſe, was to leave all the watery parts it contained, in its paſſage, and come over perfectly pure and free from phlegm. But theſe inſtruments are built upon erroneous principles, their extravagant height defeating the end it was deſigned to anſwer: if the liquor is made to boil, a conſiderable quantity of mere phlegm will come over along with the ſpirit; and if the heat is not raiſed to this pitch, neither phlegm nor ſpirit will diſtil. The moſt convenient inſtrument is the common ſtill, betwixt the body of which, and its head, an adopter or copper tube may be fixed.

567. The ſpirit being waſhed, as above directed, from its foul oil, and freed from the greateſt part of the phlegm by gentle diſtillation in a water-bath, add to every gallon of it a pound or two of pure, dry, fixed alkaline ſalt. Upon digeſting theſe together for a little time, the alkali, from its known property of attracting water and oils, will imbibe the remaining phlegm, and ſuch part of the diſagreeable unctuous matter as may ſtill be left in the ſpirit, and ſink with them to the bottom of the veſſel. If the ſpirit be now again gently drawn over, it will ariſe entirely free from its phlegm and nauſeous flavour; but ſome particles of the alkaline ſalt are apt to be carried up with it, and give what the workmen call an *urinous reliſh*: This may be prevented, by adding, previous to the laſt diſtillation, a ſmall proportion of calcined vitriol, alum, or ſal catharticus amarus; the acid of theſe ſalts will unite with and neutralize the alkali, and effectually prevent it from ariſing; while no more of the acid of the ſalts is extricated than what the alkali abſorbs.

The ſpirit obtained by this means is extremely pure, limpid, perfectly flavourleſs, and fit for the fineſt purpoſes. It may be reduced to the ſtrength commonly underſtood by proof, by mixing 20 ounces of it (by weight) with 17 ounces of water. The diſtilled cordials made with theſe ſpirits, prove much more elegant and agreeable, than when the common rectified or proof ſpirits of the ſhops are made uſe of.

If the rectified ſpirit be diſtilled afreſh from dry alkaline ſalt with a quick fire, it brings over a conſiderable quantity of the ſalt; and in this ſtate is ſuppoſed to be a more powerful menſtruum for certain ſubſtances than the pure ſpirit. This alkalized ſpirit is called *tartarized ſpirit of wine*.

568. The general virtues of vinous ſpirits have been already mentioned; (ſee MATERIA MEDICA, the *Table*.) The ſpirits impregnated with the volatile oils of vegetables, to be treated of in this ſection, have joined to thoſe the aromatic, cordial, or other virtues which reſide in the oils.

Art I. *Diſtilled Spirits.*

569. *Compound balm-water, commonly called* Eau de carmes.

Take of balm in flower, freſh gathered and cleared from the ſtalks, two pounds; lemon peel, freſh, as ſoon as pared from the fruit, four ounces; coriander ſeeds, eight ounces; nutmegs, cloves, cinnamon, each, bruiſed, two ounces; angelica roots, dried and bruiſed, one ounce; ſpirit of wine, highly rectified, ten pints. Steep the ſeveral ingredients in the ſpirit four or five days; and then draw off, in the heat of a water-bath, 10 pints. Rectify the diſtilled liquor by a ſecond diſtillation in a water-bath, drawing off only about eight pints and three quarters.

This proceſs is taken from the *Elemens de pharmacie* of M. Baumé, who obſerves, that all the aromatic ſpirits ought to be prepared in the ſame manner. When the common ſpirits of this kind are rubbed on the hands, &c. they leave, after the more volatile parts have exhaled, a diſagreeable empyreumatic ſmell; and when diluted with water, and taken medicinally, they leave in like manner a nauſeous flavour in the mouth. To remedy theſe imperfections, he made many experiments, which ſhowed, that in order to obtain theſe liquors of the deſirable qualities, the ſpirit muſt not only be perfectly pure at firſt, but that the liquor ought alſo to be rectified after it has been diſtilled from the ſubjects. In this rectification only the more volatile, ſubtle, aromatic parts of the ingredients ariſe; there remains behind a white liquor, acrid, bitter, loaded only with the groſſer oil, and deprived of all the ſpecific flavour of the ſubjects. Indeed the very imperfection complained of naturally points out this ſecond diſtillation for the remedy, as it ſhows the ſpirit to contain a grateful and ungrateful matter; the firſt of which exhales, while the other is left behind.

Aromatic ſpirituous waters have in general leſs ſmell, when newly diſtilled, than after they have been kept about ſix months. M. Baumé ſuſpects, that the preparations of this kind which have been moſt in vogue were ſuch as had been thus improved by keeping; and found, that the good effects of age might be produced in a ſhort time by means of cold. He plunges quart-bottles of the liquor into a mixture of pounded ice and ſea-ſalt: the ſpirit, after having ſuffered for ſix or eight hours the cold hence reſulting, proves as grateful as that which has been kept for ſeveral years. Simple waters alſo, after being frozen, prove far more agreeable than they were before; tho' they are always leſs ſo than thoſe which have been drawn with ſpirit, and expoſed to a like degree of cold. This melioration of diſtilled waters by froſt was taken notice of by Geoffroy, *Hiſt. Acad.* 1713.

570. *Spirit of roſemary*. L.

Take of roſemary-tops, freſh gathered, a pound and a half; proof ſpirit, one gallon. Diſtil in the heat of a water-bath, till five pints are come over.

571. *Hungary-water*.

Take of roſemary flowers, juſt gathered, two pounds; rectified ſpirit of wine, one gallon. Put them together, and immediately diſtil in a water-bath. It is generally brought to us from abroad.

This ſpirit is very fragrant, inſomuch as to be in common uſe as a perfume: that brought from abroad is ſuperior in fragrance to ſuch as is generally made among us. In order to prepare it in perfection, the vinous ſpirit ſhould be extremely pure, the roſemary-tops gathered when the flowers are full blown upon them, and committed immediately to diſtillation, particular care being taken not to bruiſe or preſs them. The beſt method of managing the diſtillation is that formerly recommended for the diſtillation of the more volatile eſſential oils and ſimple waters, viz. firſt to place the ſpirit in the ſtill, and then ſet in above the liquor, either an iron hoop, with a hair-cloth ſtretched over it, upon which the flowers are to be lightly ſpread, or rather a baſket, ſupported on three pins, reaching down to the bottom. A gentle heat being applied, juſt ſufficient to raiſe the ſpirit, its vapour, lightly percolating through the flowers, will imbibe their finer parts, without making that diſagreeable alteration which liquors applied to ſuch tender ſubjects in their groſſer form generally do. Probably the ſuperiority of the French Hungary water to that prepared among us, is owing to ſome ſkilful management of this kind, or that recommended for the foregoing preparation, and employing a perfectly pure ſpirit.

572. *Simple ſpirit of lavender*. L.

Take of lavender-flowers, freſh gathered, a pound and a half; proof ſpirit, one gallon. Draw off, by the heat of a water-bath, five pints.

Take of freſh lavender-flowers, two pounds; rectified ſpirit of wine, one gallon. Diſtil off a gallon in a water-bath. *E.*

The ſame cautions are to be obſerved here as in the diſtillation of the foregoing ſpirit. Both of them, when made in perfection, are very grateful and fragrant: they are frequently rubbed on the temples, &c. under the notion of refreſhing and comforting the nerves; and likewiſe taken internally, to the quantity of a tea-ſpoonful, as warm cordials.

573. *Compound ſpirit of lavender*. L. E.

Take of ſimple ſpirit of lavender, three pints; ſpirit of roſemary, one pint; cinnamon, one ounce; cloves, nutmegs, each half an ounce; red ſaunders, three drams. Digeſt them together for ſeven days, and then ſtrain out the ſpirit for uſe.

The red ſaunders is of no farther uſe in the compoſition than as a colouring ingredient. If a yellow ſpirit was liked, the yellow ſaunders would be an excellent article, as it not only communicates a fine colour, but likewiſe a conſiderable ſhare of medicinal virtue. A ſpirit diſtilled from the flowers of lavender and ſage, in due proportion, and digeſted in the cold for a little time with ſome cinnamon, nutmegs, and yellow ſaunders, proves a very elegant and grateful one.

This medicine has long been held in greate ſteem, under the name of *palſy-drops*, in all kinds of languors, weakneſs of the nerves, and decays of age. It may be conveniently taken upon ſugar, from 10 to 80 or 100 drops.

574. *An odoriferous ſpirit, called* ſweet honey-water.

Take of coriander ſeeds, honey, each one pound; cloves, an ounce and a half; nutmegs, benzoine, ſtorax, each an ounce; vanelloes, in number four; yellow rind of three lemons; French brandy, one gallon. Digeſt theſe ingredients together for forty-eight hours; and then diſtil off the ſpirit *in balneo mariæ*. To one gallon of this ſpirit add orange-flower water, roſe-water, of each one pound and a half; ambergris, muſk, of each five grains. Firſt grind the muſk and ambergris with ſome of the water, and afterwards put all together in a large matraſs; ſhake them well, and let them circulate for three days and nights in a gentle heat; then ſuffer them to cool, filter the liquor, and keep it cloſe ſtopped up for uſe.

575. *Another*.

Take of coriander ſeeds, one pound; lemon-peel freſh, nutmegs, each four ounces; ambergris, muſk, each five grains; clean melaſſes ſpirit, two gallons. Bruiſe the nutmegs and coriander ſeeds, and put them, with the lemon-peel and the ſpirit, into a ſmall ſtill placed *in balneo mariæ*: tie a thin cloth over the mouth, and ſprinkle thereon the ambergris and muſk reduced into fine powder: lute on the head; let the whole ſtand in digeſtion for twelve hours, and then diſtil as much as a boiling heat of the bath can force over. To this add, of roſe-water, one pint; orange-flower water, half a pint.

Theſe compoſitions are deſigned rather as perfumes than as medicines; though for ſuch as can bear their fragrance, they might be uſed to advantage in this laſt intention. The muſk and ambergris do not communicate ſo much of their ſmell as might be expected; and ſerve chiefly to heighten the flavour of the other ingredients; which theſe perfumes excellently do, when employed in very ſmall proportion, to all the odoriferous ſimples, without imparting any thing perceptible of their own. Both the foregoing ſpirits are very agreeable; a few drops of either give a fine flavour to a large quantity of other liquor. Mr Wilſon, from whom the firſt is taken, (*Pract. Chem.* p. 354.), tells us, that he often made it for king James II. and that it gives one of the moſt pleaſant ſcents that can be ſmelt to. The other is formed on the ſame plan, by omitting ſuch articles as appeared ſuperfluous in the firſt.

576. *Spirit of ſcurvygraſs.*

Take of freſh ſcurvy-graſs, bruiſed, 10 pounds; rectified ſpirit of wine, five pints. Steep the herb in the ſpirit for 12 hours; then with the heat of a water-bath diſtil off five pints.

This ſpirit is very ſtrong of the ſcurvy-graſs; and may be given, in thoſe caſes where the uſe of this herb is proper, from 20 to 100 drops. The virtues of ſcurvy-graſs reſide in a very ſubtle volatile oil, which ariſes in diſtillation both with water and pure ſpirit; and, if the liquors are expoſed to the air, ſoon exhales from both. The ſpirit, newly diſtilled, is extremely pungent; but if long kept, even in cloſe veſſels, becomes remarkably leſs ſo.

577. *Golden or purging ſpirit of ſcurvy-graſs.*

Take of ſpirit of ſcurvy-graſs, one pound; gamboge, one ounce. Diſſolve the gamboge in the ſpirit; and if any ſediment falls to the bottom, carefully decant the tinged liquor from it. This ſpirit is otherwiſe made with ſcammony, or reſin of jalep, inſtead of gamboge.

This has been in great eſteem among the common people, and ſtrongly recommended by the venders, in all kinds of ſcorbutic diſorders. It is nevertheleſs a very indifferent medicine, and little deſerves the pompous title given it. It may be taken from 20 to 60 drops, either upon ſugar or mixed with ſyrup.

Art. 2. *Diſtilled ſpirituous Waters.*

578. By *diſtilled Spirits*, are underſtood ſuch as are drawn with a ſpirit that has been previouſly rectified, or which is reduced nearly to that ſtrength in the operation: by *ſpirituous Waters*, thoſe in which the ſpirit is only of the proof ſtrength, or contains an admixture of about an equal meaſure of water. Theſe laſt have been uſually called *compound waters*, even when diſtilled from one ingredient only; as thoſe, on the other hand, which are drawn by common water, tho' from a number of ingredients, are named *ſimple*; the title *ſimple*, here, relating not to ſimplicity in reſpect of compoſition, but to the vehicle being plain water. The Edinburgh pharmacopœia denominates thoſe waters *ſimple* which are drawn from a ſingle ingredient, whether the vehicle be common water or ſpirituous water, and all thoſe *compounds* which are diſtilled from more than one.

579. *General rules for the diſtillation of ſpirituous Waters.*

I. The plants and their parts ought to be moderately and newly dried, except ſuch as are ordered freſh gathered.

II. After the ingredients have been ſteeped in the ſpirit for the time preſcribed, add as much water as will be ſufficient to prevent an empyreuma, or rather more.

III. The liquor which comes over firſt in the diſtillation, is by ſome kept by itſelf, under the title of *ſpirit*; and the other runnings, which prove milky, fined down by art. But it is better to mix all the runnings together without fining them, that the waters may poſſeſs the virtues of the plant entire; which is a circumſtance to be more regarded than their fineneſs or ſightlineſs.

IV. In the diſtillation of theſe waters, the genuine brandy obtained from wine is directed. Where this is not to be had, take, inſtead of that proof ſpirit, half its quantity of a well-rectified ſpirit prepared from any other fermented liquors: in this ſteep the ingredients, and then add ſpring-water enough both to make up the quantity ordered to be drawn off, and to prevent burning.

580. By this method more elegant waters may be obtained than when any of the common proof-ſpirits, even that of wine itſelf, are made uſe of. All vinous ſpirits receive ſome flavour from the matter from which they are extracted; and this flavour, which adheres chiefly to the phlegm or watery part, they cannot be diveſted of without ſeparating the phlegm, and reducing them to a rectified ſtate.

581. *Spirituous alexeterial water.* L.

Take of ſpearmint leaves, freſh, half a pound; angelica leaves, freſh, ſea-wormwood tops, freſh, each four ounces; proof-ſpirit, one gallon; water, as much as will prevent burning. Diſtil off one gallon.

This is a tolerably pleaſant water; it is looked upon as an alexipharmac and ſtomachic, and in theſe intententions is not unfrequently made uſe of in juleps, &c.

582. *Spirituous alexeterial water with vinegar.* L.

Take of ſpearmint leaves, angelica leaves, each half a pound; ſea-wormwood tops, four ounces; proof-ſpirit, one gallon; water, as much as is ſufficient to prevent burning; vinegar, one pint. Diſtil the freſh herbs with the ſpirit and water, drawing off one gallon; to which add the vinegar.

Angelica, after trial of ſundry other materials, has been found the moſt effectually to remove the diſagreeable flavour which the vinegar would otherwiſe communicate, and therefore this plant is ordered in a larger proportion here than in the other alexeterial waters. Perhaps it would be more eligible to add the vinegar occaſionally; for when mixed with the liquor at firſt, it is apt to throw down, upon keeping, ſome of the more valuable parts which the water received from the herbs.

583. *Compound aniſeed water.* L.

Take of aniſeeds, angelica ſeeds, each half a pound; proof-ſpirit, one gallon; water, as much as is ſufficient to prevent burning. Draw off by diſtillation one gallon.

This is a very elegant aniſeed water, the angelica ſeeds greatly improving the flavour of the aniſe: it is apt to turn out milky, if drawn ſo low as here ordered.

584. *Spirituous orange-peel water.* L.

Take of the outer rind of Seville-orange-peel, dried, half a pound; proof-ſpirit, one gallon; water, as much as is ſufficient to prevent an empyreuma. Diſtill off one gallon.

This is conſiderably ſtronger of the orange-peel than the ſimple water. It is uſed as a cordial, ſtomachic, and carminative.

585. *Cardamom-ſeed water.* L.

Take of leſſer cardamom ſeeds, freed from the huſks, four ounces; proof-ſpirit, one gallon; water, as much as is ſufficient to prevent burning. Diſtil off one gallon.

This water is a grateful cordial and carminative, the cardamom ſeeds giving over in this proceſs the whole of their flavour. It is not perhaps very neceſſary to be at the trouble of ſeparating the huſks, for theſe communicate nothing diſagreeable; the only difference is, that if employed unhuſked, a proportionably larger quantity of them muſt be taken.

586. *Caraway-water.* L. E.

Take of caraway ſeeds, half a pound; proof-ſpirit, one gallon; water, as much as will prevent burning. Diſtil off one gallon.

This is a cordial in common uſe; it contains the flavour of the caraway ſeeds in perfection.

587. *Spirituous cinnamon-water.* L.

Take of cinnamon, a pound; proof-ſpirit, a gallon; water, ſo much as will prevent burning. Draw off by diſtillation one gallon.

588. *Cinnamon-water with wine.* E.

Take of cinnamon, half a pound; proof-ſpirit, one gallon. Diſtil off one gallon.

This is a very agreeable and uſeful cordial-water, but not ſo ſtrong of the cinnamon as might be expected; for very little of the virtues of the ſpice ariſe till after the pure ſpirituous part has diſtilled.

In the *pharmacopœia reformata*, it is propoſed to make this water, by mixing the ſimple cinnamon water (553, *a*.) with ſomewhat leſs than an equal quantity of rectified ſpirit: on ſhaking them together, the liquor loſes its milky hue, ſoon becomes clear, and more elegant than the water diſtilled as above; it is equally ſtrong of the cinnamon, and free from the nauſeous taint which the common proof-ſpirits are impregnated with.

589. *Compound juniper-water.* L. E.

Take of juniper-berries, one pound; ſweet-fennel ſeeds, carraway ſeeds, each an ounce and a half; proof-ſpirit, one gallon; water, as much as is ſufficient to prevent burning. Diſtil off one gallon.

This water, mixed with about an equal quantity of the rob of juniper-berries, proves an uſeful medicine in catarrhs, debility of the ſtomach and inteſtines, and difficulty of urine. The water by itſelf is a good cordial and carminative: the ſervice which this and other ſpirituous waters do in theſe intentions, is too commonly known; though the ill conſequences that follow their conſtant uſe, are too little regarded.

590, a. *Spirituous pepper-mint water.* L.

Take of peppermint-leaves, dry, a pound and a half; proof-ſpirit, a gallon; water, as much as is ſufficient to prevent an empyreuma. Draw off by diſtillation one gallon.

This water is made uſe of in flatulent colics and other like diſorders; in which it oftentimes gives immediate relief. It ſmells and taſtes ſtrongly of the pepper-mint.

590, b. *Spirituous mint-water.* L.

Take of ſpearmint leaves, dry, a pound and a half; proof-ſpirit, a gallon; water, as much as will prevent burning. Diſtil off one gallon.

This water, if the ſpirit be good, turns out a very elegant one, and preferable, in weakneſs of the ſtomach, retching to vomit, and the like, to many more elaborate preparations. Where the diſorder is not accompanied with heat or inflammation, half an ounce of this water may be given diluted with ſome agreeable aqueous liquor.

591. *Spirituous Jamaica-pepper water.*

Take of Jamaica pepper, half a pound; proof-ſpirit, three gallons; water, a ſufficient quantity to prevent an empyreuma. Draw off by diſtillation three gallons.

This water is far more agreeable than a ſimple water drawn from the ſame ſpice; and has long had a place among the cordials both of the diſtiller and apothecary; though it has not yet been received into any public pharmacopœia.

592. *Nutmeg water.* L.

Take of nutmegs, two ounces; proof-ſpirit, a gallon; water, as much as will prevent burning. Draw off by diſtillation one gallon.

This water (with the addition only of ſome hawthorn flowers, an article of very little ſignificance) was formerly celebrated in nephritic diſorders, under the name of *aqua nephritica*. At preſent, it is regarded only as an agreeable ſpirituous liquor, lightly impregnated with the nutmeg flavour.

593. *Spirituous pennyroyal water.* L.

Take of pennyroyal leaves, dry, a pound and a half; proof-ſpirit, a gallon; water, as much as will prevent burning. Diſtil off one gallon.

This water has a good ſhare of the flavour of the pennyroyal, and is pretty much in uſe as a carminative and antihyſteric.

594. *Compound horſeradiſh water.*

Take of garden ſcurvygraſs leaves, freſh, four pounds; horſeradiſh root freſh, orange-peel freſh, each two pounds; nutmegs, nine ounces; proof-ſpirit, two gallons; water, a ſufficient quantity to prevent burning. Draw off by diſtillation two gallons. *L.*

Take of horſeradiſh root, three pounds; rectified ſpirit of wine, four pints. Diſtil off four pints in a water-bath, and to the diſtilled liquor add eight pints of ſimple Jamaica-pepper water. *E.*

Both theſe waters are very elegant ones, and as well adapted for the purpoſes of an antiſcorbutic, as any thing that can well be contrived in this form.

Muſtard-ſeed, though not hitherto employed in theſe kinds of compoſitions, ſhould ſeem to be an excellent ingredient; it gives over the whole of its pungency, and is likewiſe leſs periſhable than moſt of the other ſubſtances of this claſs: this ſeed wants no addition, unleſs ſome aromatic material to furniſh an agreeable flavour.

Sect. VI. *Concentration of the medicinal parts of Juices and Infuſions by Evaporation.*

595. When vegetable juices, or watery or ſpirituous decoctions or infuſions, are expoſed to a continued heat, the fluid, gradually evaporating, carries off with it ſuch volatile matters as it was impregnated with, and leaves the more fixed united together into one maſs. As the object of the preceding ſection was the collection of the volatile principle which exhales along with the fluid, that of the preſent is this re-union and concentration of the fixed matter. The maſs which remains from the evaporation of the expreſſed juice of a plant, is called an *inſpiſſated juice;* from watery decoctions or infuſions, an *extract;* from ſpirituous tinctures, a *reſin,* or *eſſential extract.* The term *extract* is frequently uſed alſo as a general appellation of all the three kinds. Inſpiſſated juices and watery decoctions, particularly the former, when evaporated no further than to the conſiſtence of oil or honey, are called *rob* or *ſapa;* and ſpirituous tinctures, reduced to a like conſiſtence, are called *balſam.*

§ 1. Inspissated Juices.

596. What relates to the expreſſion of juices, has already been delivered in Sect. ii. with the moſt effectual means of preſerving them in their liquid ſtate, and a general account of what ſubſtances do or do not give out their virtues with their juices. In the inſpiſſation of juices, there is further to be conſidered the volatility or fixity of their medicinal parts: if a plant loſes its virtue, or part of its virtue, in being dried, it is obvious that the juice muſt loſe as much in being inſpiſſated to dryneſs, how gentle ſoever the heat be with which the inſpiſſation is performed. It is likewiſe to be obſerved, that the medicinal parts of ſome juices are kept in a ſtate of perfect ſolution by the watery fluid, ſo as to be completely retained by it after the liquor has been made fine by ſettling, ſtraining, or other means; while the medicinal parts of others, not diſſoluble by watery menſtrua, are only diffuſed through the liquor in the ſame manner as the feculences are, and ſeparate along with theſe on ſtanding.

597. *Rob of elder-berries.*

Let the depurated juice of elder-berries be inſpiſſated with a gentle heat. *L.*

This preparation, made with or without ſugar, keeps well, and proves a medicine of conſiderable importance as an aperient, generally promoting the natural excretions by ſtool, urine, or ſweat. The doſe is from a dram or two to an ounce or more. A ſpoonful, diluted with water, is uſefully taken in common colds at bed-time.

598. *Inſpiſſated juice of ſloes, or German acacia.*

Let any quantity of the juice of unripe ſloes be inſpiſſated over a gentle fire.

This juice is inſpiſſated nearly to dryneſs, care being taken to prevent its burning, as directed in the following §, for making extracts with water. It is a moderately ſtrong aſtringent, ſimilar to the Egyptian acacia, for which it has been commonly ſubſtituted in the ſhops. It is given in fluxes and other diſorders where ſtyptic medicines are indicated, from a ſcruple to a dram.

599. *Extract of plantane.*

Let any quantity of the juice of plantane-leaves be depurated; either by ſuffering it to ſettle, and then decanting off the clear liquor; or by ſtraining; or by clarification by whites of eggs. Afterwards evaporate the juice in a ſand-heat, to the conſiſtence of honey. After the ſame manner, extracts may be made from all acid, cooling, ſtyptic, juicy plants.

This is a method of treating plants very little practiſed; but which promiſes, if duly proſecuted, to afford medicines of conſiderable power. There are many common and neglected herbs, as plantane, chickweed, chervil, &c. whoſe juices in their dilute ſtate, as well as the herbs in ſubſtance, ſeem to be altogether inſignificant, but which, when the juice is well depurated from the feculent matter, and concentrated by the evaporation of the fluid, yield extracts which diſcover to the taſte no ſmall activity. Theſe extracts, like thoſe prepared from the juices of moſt of the ſummer-fruits, if inſpiſſated to dryneſs, grow moiſt again in the air.

600. *Extract of hemlock.*

See nº 249.

This is the preparation of hemlock lately publiſhed at Vienna by Dr Storck; who recommends it as a high reſolvent in many obſtinate diſorders, where the common remedies avail nothing. He obſerves, that ſmall doſes ſhould always be begun with, as two grains, made into a pill, twice a-day; and that, by gradually increaſing the doſe, it may be given to two, three, or even four drams a-day, and continued in ſuch quantities for ſeveral weeks: that it may be uſed with ſafety, in infancy, old age, and pregnancy: that it neither accelerates nor diſturbs the circulation; neither heats nor cools; nor affects the animal-functions: that it increaſes the ſecretions, and renders the mouth moiſt; ſeldom purges; very rarely vomits; ſometimes augments perſpiration; often produces a copious diſcharge of viſcid urine; but in many patients does not increaſe any of the ſenſible evacuations: that it removes obſtructions and their conſequences; relieves rheumatic pains, though of long continuance; diſcuſſes ſcirrhous tumours, both internal and external; and cures dropſies and conſumptions proceeding from ſcirrhoſities; that it often diſſolves cataracts, or ſtops their progreſs, and has ſometimes removed the gutta ſerena: that inveterate cutaneous eruptions, ſcald-heads, malignant ulcers, cancers, the malignant fluor albus and gonorrhœa of long ſtanding, obſtinate remains of the venereal diſeaſe, and caries of the bones, generally yield to it: that for the moſt part it is neceſſary to continue this medicine for a very conſiderable time, before the cure is effected, or much benefit perceived from it: that in ſome caſes it failed of giving any relief, and that he met with ſome perſons who could not bear its effects; and that conſequently there muſt be ſome latent difference in the habit, the diagnoſtic ſigns of which are at preſent unknown: that though it is by no means infallible, any more than other medicines in their reſpective intentions, yet the great number of deplorable caſes that have been happily cured by it is ſufficient to recommend it to further trials. The efficacy of this medicine is confirmed by many eminent practitioners abroad; though the trials hitherto made of it in this country have not been attended with much ſucceſs. Somewhat, perhaps, may depend upon the time of the plant's being gathered, and the manner of the preparation of the extract. Dr Storck himſelf takes notice of ſome miſtakes committed in this reſpect: ſome have left the herb in a heap for ſeveral days, whence part of it withered, part rotted, and the juice became thick and mucilaginous: others have taken a very large quantity of the juice, and boiled it down in copper veſſels with a great heat, by which means a ſtrong fetor was diffuſed to a conſiderable diſtance, and the moſt efficacious parts diſſipated: others, with officious care, have clarified the juice, and thus obtained a black tenacious extract, retaining but a ſmall degree of the ſpecific ſmell of the plant: the extract duly prepared, according to the preſcription above referred to, is of a greeniſh brown colour, and a very diſagreeable ſmell, like that of mice. But though there is reaſon to believe, that much of the extract uſed here had been ill prepared, we can by no means admit that its general inefficacy was owing to this cauſe; for though there are few inſtances of its diſcovering any valuable medicinal powers, there are ſeveral of its having activity enough, even in ſmall doſes, to produce alarming ſymptoms.

601. *Elatèrium.*

Slit ripe wild cucumbers, and having very lightly preſſed out the juice, paſs it thro' a fine hair-ſieve into a glazed earthen veſſel. After ſtanding for ſome hours, the thicker part will fall to the bottom; from which the thinner is to be poured off, and what liquid matter is ſtill left is to be ſeparated by filtration. The remaining thick part is to be covered with a linen cloth, and expoſed to the ſun, or other gentle heat, till grown thoroughly dry. L.

Preparations of this kind have been commonly called *fæculæ*. The filtration above directed, for draining off ſuch part of the watery fluid as cannot be ſeparated by decantation, is not the common filtration through paper, for this does not ſucceed here: the groſſer parts of the juice, falling to the bottom, form a viſcid cake upon the paper, which the liquid cannot paſs through. The ſeparation is to be attempted in another manner, ſo as to drain the fluid from the top: this is effected by placing one end of ſome moiſtened ſtrips of woollen cloth, ſkains of cotton, or the like, in the juice, and laying the other end over the edge of the veſſel, ſo as to hang down lower than the ſurface of the liquor: by this management the ſeparation ſucceeds in perfection.

Elaterium is a ſtrong irritating cathartic, and oftentimes operates alſo as an emetic. It is never to be ventured on but in indolent phlegmatic habits, as in dropſies, in which it is by ſome particularly recommended. Two or three grains are in general a ſufficient doſe.

§ 2. EXTRACTS WITH WATER.

602. Theſe extracts are prepared, by boiling the ſubject in water, and evaporating the ſtrained decoction to a thick conſiſtence.

This proceſs affords us ſome of the more active parts of plants, free from the uſeleſs indiſſoluble earthy matter, which makes the largeſt ſhare of their bulk. There is a great difference in vegetable ſubſtances, with regard to their fitneſs for this operation; ſome yielding to it all their virtues, and others ſcarce any. Thoſe parts in which the ſweet, glutinous, emollient, cooling, bitter, auſtere, aſtringent, virtues reſide, are for the moſt part totally extracted by the boiling water, and remain almoſt entire upon evaporating it: whilſt thoſe which contain the peculiar odour, flavour, and aromatic quality, are either not extracted at all, or exhale along with the menſtruum. Thus gentian root, which is almoſt ſimply bitter, yields an extract poſſeſſing, in a ſmall volume, the whole taſte and virtues of the root: wormwood, which has a degree of warmth and ſtrong flavour joined to the bitter, loſes the two firſt in the evaporation, and gives an extract not greatly different from the foregoing; the aromatic quality of cinnamon, is diſſipated by this treatment, its aſtringency remaining: whilſt an extract made from the flowers of lavender and roſemary, diſcovers nothing either of the taſte, ſmell, or virtues of the flowers.

General rules for making extracts with water.

I. It is indifferent, in regard to the medicine, whether the ſubject is uſed freſh or dry; ſince nothing that can be preſerved in this proceſs, will be loſt by drying. In regard to the facility of extraction, there is a very conſiderable difference; vegetables in general giving out their virtues more readily, when moderately dried, than when freſh.

II. Very compact dry ſubſtances ſhould be reduced into exceeding ſmall parts, previous to the affuſion of the menſtruum.

III. The quantity of water ought to be no greater than is neceſſary for extracting the virtues of the ſubject. A difference herein will ſometimes occaſion a variation in the quality of the product: the larger the quantity of liquor, the longer fire will be requiſite for evaporating it, and conſequently the more of the volatile parts of the ſubject will be diſſipated. A long-continued heat likewiſe makes a conſiderable alteration in the matter which is not volatile: ſweet ſubſtances, by long boiling with water, become nauſeous; and the draſtic purgatives loſe their virulence, tho' without any remarkable ſeparation of their parts.

IV. The decoctions are to be depurated by colature; and afterwards ſuffered to ſtand for a day or two, when a conſiderable quantity of ſediment is uſually found at the bottom. If the liquor, poured off clear, be boiled down a little, and afterwards ſuffered to cool again, it will depoſit a freſh ſediment, from which it may be decanted before you proceed to finiſh the evaporation. The decoctions of very reſinous ſubſtances do not require this treatment, and are rather injured by it; the reſin ſubſiding along with the inactive dregs.

V. The evaporation is moſt conveniently performed in broad ſhallow veſſels: the larger the ſurface of the liquor, the ſooner will the aqueous parts exhale: this effect may likewiſe be promoted by agitation.

VI. When the matter begins to grow thick, great care is neceſſary to prevent its burning. This accident, almoſt unavoidable if the quantity is large, and the fire applied as uſual under the evaporating pan, may be effectually ſecured againſt, by carrying on the inſpiſſation after the common manner, no farther than to the conſiſtence of a ſyrup, when the matter is to be poured into ſhallow tin or earthen pans, and placed in an oven, with its door open, moderately heated; which acting uniformly on every part of the liquid, will ſoon reduce it to any degree of conſiſtence required. This may likewiſe be done, and more ſecurely, *in balneo mariæ*, by ſetting the evaporating veſſel in boiling water; but the evaporation is here exceeding ſlow and tedious.

VII. Extracts are to be ſprinkled with a little ſpirit of wine, to prevent their growing mouldy. *L.* They ſhould be kept in bladders moiſtened with ſweet oil. *E.*

603. *Extract of wormwood.*

Boil dried wormwood leaves in water, ſupplying freſh water occaſionally till the herb has given out all its virtues to the liquor. Strain the decoction through a woollen cloth, and evaporate it, in a ſand-heat, to the conſiſtence of honey.

This extract is almoſt ſimply bitter; the peculiar flavour of the wormwood being diſſipated in the evaporation. The chemiſts uſually prepare the extract of wormwood from the decoction which remains in the ſtill after the diſtillation of the eſſential oil: and, provided the ſtill has been perfectly clean, and the liquor not ſtood too long in it after the diſtillation, this piece of frugality is not to be diſapproved of; ſince, whether we catch the exhaling vapour, or ſuffer it to be diſſipated in the air, the remaining extract will be the ſame.

604. *Extract of leſſer centaury.*

This is directed to be prepared in the ſame manner as the preceding. It is the oldeſt extract we have any account of: its preparation is very accurately and circumſtantially ſet down in a book uſually aſcribed to Galen, *De virtute centaureæ.* The author of that treatiſe recommends the extract as a medicine of excellent ſervice in many caſes; and looks upon centaury as a ſpecific againſt the bite of a mad dog and other venomous animals. It is doubtleſs an uſeful bitter, poſſeſſing the general virtues of the ſubſtances of that claſs; but cannot well be ſuppoſed to have any others.

605. *Extract of chamomile.*

This extract is prepared from the flowers of chamomile, in the ſame manner as thoſe of the leaves of the two preceding plants. Nor is it greatly different from thoſe extracts in quality; the ſpecific flavour of the chamomile exhaling in the evaporation. The chemiſts commonly prepare it, like that of wormwood, from the decoction remaining after the diſtillation of the eſſential oil.

606. *Extract of elecampane.* L.

Boil the roots of elecampane in water, preſs out and ſtrain the decoction, and ſet it by to ſettle. Then pour off the clear liquor, and boil it down to a pilular conſiſtence; taking care, towards the end, to prevent its burning to the veſſel.

This extract retains a conſiderable ſhare of the virtues of the root: its taſte is ſomewhat warm, and not ungratefully bitteriſh. It is given, from a ſcruple to a dram, in a lax ſtate of the fibres of the ſtomach, and in ſome diſorders of the breaſt.

607. *Extract of gentian.* L. E.

This extract is prepared from the roots of gentian, in the ſame manner as the foregoing extracts. It is of a reddiſh brown colour, and an intenſely bitter taſte, being one of the ſtrongeſt of the vegetable bitters.

608. *Extract of liquorice.* L.

Lightly boil freſh liquorice roots in water, preſs the decoction through a ſtrainer; and after the fæces have ſubſided, evaporate it until it no longer ſticks to the fingers; taking care, towards the end of the operation, to prevent an empyreuma.

It is convenient, before boiling the root, to cut it tranſverſely into ſmall pieces, that it may more readily give out its virtues by light coction: if the boiling is long continued, the rich ſweet taſte, for which this preparation is valued, will be greatly injured. For the ſame reaſon, the quantity of water ought to be no larger than is abſolutely neceſſary to extract the virtues of the root: a quart, or at moſt three pints, will be fully ſufficient for a pound of liquorice. It would be of conſiderable advantage to the preparation, and probably (when made in quantity) leſs expenſive to the preparer, to uſe, inſtead of the decoction, juice of liquorice, preſſed out betwixt iron rollers, after the manner practiſed abroad for obtaining the juice of the ſugar-cane.

Large quantities of extract of liquorice have been uſually brought to us from Spain and other foreign countries; but it is very rarely met with in the ſhops in perfection; the makers of this commodity, both at home and abroad, being either very ſlovenly in its preparation, or deſignedly mixing it with ſand and other impurities. When made with due care, it is exceeding ſweet, not at all bitteriſh or nauſeous, more agreeable in taſte than the root itſelf, of a pleaſant ſmell, a reddiſh brown colour, and, when drawn out into ſtrings, of a bright golden colour; totally ſoluble in water, without depoſiting any fæces.

This preparation would be very convenient for many purpoſes in the ſhops, if kept in a ſomewhat ſofter conſiſtence than that of an extract. The only inconvenience attending this ſoft form is, its being apt in a ſhort time to grow mouldy: but this may be effectually prevented, by the addition of a ſmall portion of ſpirit of wine.

609. *Extract of black hellebore.* L. E.

This extract is prepared from the roots of black hellebore, in the ſame manner as that of elecampane roots above deſcribed. It purges with conſiderably leſs violence than the hellebore in ſubſtance; and appears to be one of the beſt preparations of that root, when intended to act only as a cathartic. The doſe is from 8 or 10 grains to 15 or more.

610. *Extract of logwood.* L.

Take of logwood, reduced to powder, one pound. Boil it in a gallon of water till half the liquor is conſumed, repeating the coction with freſh water four times, or oftener: the ſeveral decoctions are to be mixed together, paſſed through a ſtrainer, and evaporated to a due conſiſtence.

This extract has an agreeable ſweet taſte, with ſome degree of aſtringency; and hence becomes ſerviceable in diarrhœas, for blunting the acrimony of the juices, and moderately conſtringing the inteſtines and orifices of the ſmaller veſſels: It may be given from a ſcruple to half a dram, and repeated five or ſix times a-day to advantage. During the uſe of this medicine, the ſtools are frequently tinged red by it; which has occaſioned ſome to be alarmed, as if the colour proceeded from blood: the preſcriber therefore ought to caution the patient againſt any ſurpriſe of this kind.

611. *Extract of Peruvian bark, ſoft and hard.* L.

Boil a pound of powdered bark in five or ſix quarts of water for an hour or two, and pour off the liquor; which whilſt hot will be red and tranſparent, but on growing cold becomes yellow and turbid. The remaining bark is to be boiled again in the ſame quantity of water as before; and this proceſs repeated till the liquor remains tranſparent when cold. All the decoctions, ſtrained and mixed together, are to be evaporated over a very gentle fire to a due conſiſtence, care being taken to prevent the matter from burning.

This extract is directed to be kept in the ſhops, both in a ſoft and a hard form; the firſt of a proper conſiſtence for making into pills; the other fit for being reduced into powder.

612. *Extract of guaiacum wood, ſoft and hard.* L.

Boil a pound of ſhavings of guaiacum in a gallon of water till half the liquor is waſted, repeating the operation four times, or oftener, with the ſame quantities of freſh water. The ſeveral decoctions, paſſed through a ſtrainer, are to be mixed and inſpiſſated together; when the aqueous parts are almoſt entirely exhaled, a little rectified ſpirit of wine is to be added, that the whole may be reduced into an uniform and tenacious maſs. This extract is to be prepared as the foregoing, in a ſoft and hard form.

Here the reſinous parts of the wood, which were boiled out with the water, are apt to ſeparate towards the end of the inſpiſſation: Hence an addition of ſpirit becomes neceſſary to keep them united with the reſt of the matter. The extract agrees in virtue with the wood. See GUAIACUM.

613. *Extract of rue.* L.

This is prepared from the leaves of rue, in the ſame manner as that of elecampane roots already deſcribed. It retains a conſiderable ſhare of the warmth and pungency of the rue; for though the principal virtues of rue reſide in an eſſential oil, yet the oil of this plant, as formerly obſerved under the head of thoſe preparations, is not of a very volatile kind.

614. *Extract of ſavin.* L.

This extract is prepared from the leaves of ſavin in the ſame manner as the preceding. It does not retain ſo much as that extract does of the virtues of its ſubject, the oil of ſavin being more volatile than that of rue.

615. *Gum and reſin of aloes.* L.

Boil four ounces of ſocotorine aloes in two pints of water till as much as poſſible of the aloes is diſſolved. The ſolution ſuffered to reſt for a night, will depoſit the reſin to the bottom of the veſſel: after which, the remaining liquor, ſtrained, if needful, is to be evaporated, that the gum may be left.

The gum of aloes is ſomewhat leſs purgative, and conſiderably leſs diſagreeable, than the crude juice.

616. *The pills or extract of Rudius.*

Take of black-hellebore roots, colocynth, ſocotorine aloes, each two ounces; ſcammony, one ounce; vitriolated tartar, two drams; diſtilled oil of cloves, one dram. Bruiſe the colocynth and hellebore, pour on them two quarts of water, and boil to the conſumption of half the liquor: paſs the decoction through a ſtrainer, and evaporate it to the conſiſtence of honey, adding the aloes and ſcammony reduced into fine powder: when the maſs is taken from the fire, mix into it the vitriolated tartar and diſtilled oil.

This preparation is a medicine of great importance as a cathartic.

617. *Rob of juniper-berries.*

Let juniper-berries, thoroughly bruiſed, be boiled in a ſufficient quantity of water, the liquor ſtrained, and inſpiſſated to the conſiſtence of honey.

This preparation may be made alſo from the decoction that remains after the diſtillation of the eſſential oil of the berries. It has a ſweet balſamic taſte, accompanied with a greater or leſs bitterneſs, according as the ſeeds of the berry were more or leſs thoroughly bruiſed. This elegant preparation, though not received in our pharmacopœias, ſeems not unworthy of a place in the ſhops. Hoffman has a great opinion of it in debilities of the ſtomach and inteſtines, and in the difficulties of urine familiar to perſons of an advanced age.

618. Beſides the above extracts, there are ordered, in the preſent edition of the Edinburgh pharmacopœia, one from the heads of puppies; another from the ſeeds of hemlock ſcarce come to maturity; and a third from the leaves of *pulſatilla nigricans*. They are to be made in the ſame manner with the extract of gentian, n° 607.

§ 3. EXTRACTS WITH RECTIFIED SPIRITS.

619. RECTIFIED ſpirit of wine diſſolves the eſſential oils and reſins of vegetables, and does not readily carry off the oil in its exhalation, the heat ſufficient to exhale pure ſpirit being much leſs than that in which water conſiderably evaporates, or moſt eſſential oils diſtil. Hence a reſinous or ſpirituous extract of wormwood, contrary to that made with water, contains the warmth and flavour as well as bitterneſs of the herb; one made from cinnamon poſſeſſes its aromatic virtue, as well as its aſtringency; and one from lavender and roſemary flowers retains great part of their flavour and virtues; the volatile parts, which are carried off by water in its evaporation, being left behind by ſpirit.

The ſpirit employed for this purpoſe ſhould be perfectly free from any ill flavour, which would be communicated in part to the preparation; and from any admixture of phlegm or water, which would not only vary its diſſolving power, but, likewiſe evaporating towards the end of the inſpiſſation, would promote the diſſipation of the volatile parts of the ſubject. Hence alſo the ſubject itſelf ought always to be dry: thoſe ſubſtances which loſe their virtue by drying, loſe it equally on being ſubmitted to this treatment with the pureſt ſpirit.

The inſpiſſation ſhould be performed from the beginning in the gentle heat of a water-bath. It is not needful to ſuffer the ſpirit to evaporate in the air: greateſt part of it may be recovered by collecting the vapour in the common diſtilling veſſels. If the diſtilled ſpirit is found to have brought over any flavour from the ſubject, it may be advantageouſly reſerved for the ſame purpoſes again.

620. It is obſervable, that though *rectified ſpirit* is the proper menſtruum of the pure volatile oils and of the groſſer reſinous matter of vegetables, and *water* of the mucilaginous and ſaline; yet theſe principles are, in almoſt all plants, ſo intimately combined together, that whichever of theſe liquors is applied at firſt, it will take up a portion of what is directly ſoluble only in the other. Hence ſundry vegetables, extremely reſinous, and whoſe virtues conſiſt chiefly in their reſin, afford nevertheleſs very uſeful extracts with water, though not equal to thoſe which may be obtained by a prudent application of ſpirit. Hence, alſo, the extracts made from moſt vegetables by pure ſpirit are not mere reſins; a part of the gummy matter, if the ſubject contained any ſuch, being taken up along with the reſin, an admixture of great advantage to it in a medicinal view. The ſpirituous extracts of ſeveral vegetable ſubſtances, as mint-leaves, rhubarb, ſaffron, diſſolve in water as well as in ſpirit.

621. Pure reſins are prepared by mixing with ſpirituous tinctures of very reſinous vegetables a quantity of water. The reſin, incapable of remaining diſſolved in the watery liquor, ſeparates and falls to the bottom; leaving in the menſtruum ſuch other principles of the plant as the ſpirit might have extracted at firſt along with it.

622. *Reſin of jalap.*

Take any quantity of jalap-root very well bruiſed; pour upon it ſo much rectified ſpirit of wine as will cover it to the height of four fingers, and digeſt them together in a ſand-heat, that the ſpirit may extract the virtue of the root. Filter the tincture through paper, put it into a retort, and diſtil off one half of the ſpirit. Add to the remainder a proper quantity of water, and the reſin will precipitate to the bottom: divide it into little cakes, and dry it with a very gentle heat.

This preparation is a pure reſin; ſuch gummy parts as the ſpirit might have taken up remaining ſuſpended in the liquor. Its indiſſolubility in any aqueous fluid, and its tenacious quality, by which it adheres to the coats of the inteſtines, and occaſions great irritation and gripes, forbid its being ever given by itſelf. It is fitted for uſe, by thoroughly triturating it with teſtaceous powders, by grinding it with almonds or powdered gum, and making the compound into an emulſion with water; or by diſſolving it in ſpirit of wine, and mixing the ſolution with a proper quantity of ſyrup or of mucilage. Six or eight grains, managed in either of theſe ways, prove powerfully cathartic, and generally without griping or greatly diſordering the body.

623. *Reſin of Peruvian bark.*

This reſin is made in the ſame manner as the foregoing, and proves an elegant preparation of the bark, much ſtronger in taſte than the watery extract, (611.) It is nearly equivalent to about ten times its quantity of the bark in ſubſtance. There does not, however, appear to be any advantage in ſeparating the pure reſin by the addition of water, either in this or in the other articles. In regard to the bark particularly, it is more adviſeable to endeavour to unite into one compound all that can be extracted from it by watery and ſpirituous menſtrua: and accordingly the Edinburgh college has received a preparation of this kind, n° 627.

624. *Extract of ſaffron.*

Digeſt ſaffron in freſh quantities of pure ſpirit of wine, as long as the ſpirit extracts any colour from it. Mix the ſeveral tinctures together, and diſtil off the ſpirit in a tall glaſs veſſel by the heat of a water-bath, till the reſiduum appears of the conſiſtence of oil or balſam. *Pharm. Bran.*

This is an elegant and high cordial. Boerhaave ſays it poſſeſſes ſuch exhilarating virtues, that if uſed a little too freely, it occaſions an almoſt perpetual and indecent laughing. He obſerves, that it tinges the urine of a red colour, and that it mingles with water, ſpirit, and oils, but is moſt conveniently taken in a glaſs of Canary or other rich wine. A few drops are ſufficient for a doſe.

§ 4. EXTRACTS with SPIRIT and WATER.

625. THERE are ſundry vegetables, particularly thoſe of a reſinous nature, which are treated, to better advantage, with a mixture of water and ſpirit, than with either of them ſingly. The virtues of reſinous woods, barks, and roots, may indeed be in great part extracted by long boiling in freſh portions of water; but at the ſame time they ſuffer a conſiderable injury from the continued heat neceſſary for the extraction, and for the ſubſequent evaporation of ſo large a quantity of the fluid. Rectified ſpirit of wine is not liable to this inconvenience; but the extracts obtained by it, from the ſubſtances here intended, being almoſt

purely reſinous, are leſs adapted to general uſe than thoſe in which the reſin is divided by an admixture of the gummy matter, of which water is the direct menſtruum.

There are two ways of obtaining theſe compound or gummy reſinous extracts: one, by uſing proof-ſpirit, that is, a mixture of about equal parts of ſpirit and water, for the menſtruum; the other, by digeſting the ſubject firſt in pure ſpirit, and then in water, and afterwards uniting into one maſs the parts which the two menſtrua have ſeparately extracted. In ſome caſes, where a ſufficiency of gummy matter is wanting in the ſubject, it may be artificially ſupplied, by inſpiſſating the ſpirituous tincture to the conſiſtence of a balſam, then thoroughly mixing with it a thick ſolution of any ſimple gum, as mucilage of gum arabic, and exſiccating the compound with a gentle heat. By this method are obtained elegant gummy reſins, extemporaneouſly miſcible with water into milky liquors.

626. *Extract of jalap.*

Upon powdered jalap pour ſome rectified ſpirit of wine, and with a gentle heat extract a tincture; boil the remaining jalap in freſh parcels of water. Strain the firſt tincture, and draw off the ſpirit, till what remains begins to grow thick; boil the ſtrained decoction alſo to a like thickneſs; then mix both the inſpiſſated matters together, and with a gentle fire reduce the whole to a pilular conſiſtence. L.

Take of jalap root, one pound; rectified ſpirit of wine, four pints; water, two pints. Digeſt them together for eight days, and ſtrain. Diſtil off the ſtrained liquor in a retort to one half. Evaporate the remainder in a water-bath, keeping the matter conſtantly ſtiring towards the end, ſo as to make it into a ſmooth extract. E.

This extract is an uſeful purgative, preferable to the crude root, as being of more uniform ſtrength, and as the doſe, by the rejection of the woody parts, is rendered ſmaller; the mean doſe is twelve grains. If the ſpirituous tincture was inſpiſſated by itſelf, it would afford a reſinous maſs, which, unleſs thoroughly divided by proper admixtures, occaſions violent griping, and yet does not prove ſufficiently cathartic; the watery decoctions yield an extract, which operates exceeding weakly: both joined together, as in this preparation, compoſe an effectual and ſafe purge. This method of making extracts might be advantageouſly applied to ſundry other reſinous ſubſtances, as the dry woods, roots, barks, &c. A ſmall quantity of ſpirit takes up the reſin, and much leſs water than would otherwiſe be neceſſary extracts all the other ſoluble parts.

627. *Extract of Peruvian bark.* E.

The college of Edinburgh has directed the extract of bark to be made with water and ſpirit in the ſame manner as the preceding. In the bark we may diſtinguiſh two kinds of taſtes, an aſtringent and a bitter one; the former of which ſeems to reſide in the reſinous matter, and the latter chiefly in the gummy. The watery extract (n° 611) is moderately ſtrong in point of bitterneſs, but of the aſtringency it has only a ſmall degree. The pure reſin, on the other hand, (n° 623.) is ſtrong in aſtringency, and weak in the bitterneſs. Both qualities are united in the preſent extract; which appears to be the beſt preparation of this kind that can be obtained from this valuable drug.

728. *Extract of logwood.* E.

This extract is directed in the Edinburgh pharmacopœia to be prepared as the foregoing; and the ſame treatment is judiciouſly ordered for all the reſinous drugs in general.

629. *Cathartic extract.*

Take of ſocotorine aloes, an ounce and a half; colocynth, ſix drams; ſcammony, leſſer cardamoms huſked, each half an ounce; proof-ſpirit, one pint. Having cut the colocynth ſmall, and bruiſed the ſeeds, pour on them the vinous ſpirit, and digeſt with a gentle heat for four days. Preſs out the tincture, and diſſolve therein the aloes and ſcammony, firſt ſeparately reduced to powder; then draw off the ſpirit, and inſpiſſate the remaining maſs to a pilular conſiſtence.

This compoſition anſwers very effectually the intention expreſſed in its title, ſo as to be relied on in caſes where the patient's life depends on its taking place; the doſe is fifteen grains to half a dram.

530. *Cordial confection.* L.

Take of roſemary tops freſh, juniper-berries, each one pound; leſſer cardamom ſeeds huſked, zedoary, ſaffron, each half a pound. Extract a tincture from theſe ingredients with about a gallon and a half of proof-ſpirit: let the tincture be ſtrained off, and reduced by a gentle heat to the weight of about two pounds and a half; then add the following ingredients very finely pulverized, and make the whole into an electuary: Compound powder of crabs-claws, ſixteen ounces; cinnamon, nutmegs, each two ounces; cloves, one ounce; double-refined ſugar, two pounds.

This confection is compoſed of the more unexceptionable ingredients of a compoſition formerly held in great eſteem, and which was called, from its author, *Confectio Raleighana*.

The confection is a ſufficiently grateful and moderately warm cordial; and frequently given in that intention, from eight or ten grains to a ſcruple or upwards, in boluſes and draughts. The extract retains a conſiderable ſhare of the flavour and virtue of the ingredients, though not near ſo much as if a rectified ſpirit had been employed. The operator ſhould be particularly careful to extract as much from the ingredients as the ſpirit will take up; otherwiſe the inſpiſſated matter turns out ſo thin, and of ſo little tenacity, that the powders are apt to ſeparate and ſubſide from it in keeping. The crabs-claw powder does not appear to be very neceſſary; and is inſerted rather in compliance with the original, than from its contributing any thing to the intention of the medicine.

Sect. VII. *Empyreumatic Oils.*

631. Vegetable and animal ſubſtances, and mineral bitumens, on being urged with a red heat, have their original properties deſtroyed, and are reſolved or

changed into products of a different nature from what pre-exiſted in the ſubject. By burning them in the open air, a part is changed into aſhes, a part into ſoot, and a part is diſſolved by the air. Expoſed to the fire in cloſe veſſels (as in thoſe called *retorts*, having receivers adapted to them for detaining the volatile parts), they are reſolved into fetid oils, and different kinds of ſaline ſubſtances which riſe into the receiver; and a black coal which remains behind, and which, though no farther alterable in cloſe veſſels, on admitting air burns into white aſhes. The oils, called from their fetid burnt ſmell *empyreumatic*, are the objects of the preſent ſection. Some of theſe however being obtained in the ſame proceſs with certain ſaline bodies of more importance than themſelves, are referred to the head of ſaline preparations.

632. *Oil of box.* L.

Diſtil pieces of boxwood in a retort, with a ſand-heat gradually increaſed: the oil will come over along with an acid ſpirit, which is to be ſeparated by a funnel.

633. *Oil of guaiacum.*

Put any quantity of chips of guaiacum into an earthen long-neck, or a glaſs retort, and diſtil either in a ſand-bath or an open fire, increaſing the heat by degrees. At firſt an acid liquor will come over; afterwards a light red oil; and at length, in the utmoſt degree of fire, a thick black oil which ſinks through the other liquors to the bottom of the receiver. Oils may be obtained after the ſame manner from every kind of wood.

The oils obtained by this treatment from different woods and plants are nearly of the ſame qualities: they have all a very diſagreeable acrid taſte, and a burnt ſtinking ſmell, without any thing of the peculiar flavour, taſte, or virtues, of the ſubject which afforded them. The preſent practice rarely employs thoſe oils any otherwiſe than for external purpoſes, as the cleanſing of foul bones, for the tooth-ach, againſt ſome kinds of cutaneous eruptions, old pains and aches, and the like; and for theſe not very often.

634. *Compound oil of balſam of Copaiva.* L.

Take two pounds of balſam of Copaiva, and four ounces of gum guaiacum. Diſtil them in a retort, continuing the operation till a pint of oil is come over.

The mixture, undiſtilled, proves a medicine of conſiderable efficacy in rheumatic caſes, &c. In diſtillation the guaiacum gives over little. The balſam diſtilled in a retort, with or without the gum, yields firſt a light coloured oil, ſmelling conſiderably of the ſubject; this is immediately followed by a darker coloured oil, and afterwards by a blue one, both which have little other ſmell than the empyreumatic one that diſtinguiſhes the oils of this claſs: their taſte is very pungent and acrimonious. This balſam diſtilled with water yields as much eſſential oil as above of empyreumatic.

635. *The anodyne, commonly called* Guido's balſam.

Take of tacamahaca in powder, Venice turpentine, each equal parts. Put them into a retort, whereof they may fill two-thirds, and diſtil with a fire gradually increaſed. Separate, according to art, the red oil, or balſam, from the liquor that ſwims above it.

This oil is ſuppoſed to be anodyne and diſcutient.

636. *Dippel's animal-oil.*

Take any quantity of the empyreumatic oil diſtilled from animal-ſubſtances, as that of hartſhorn (the preparation of which is deſcribed along with that of the volatile ſalt and ſpirit in the following ſection. Put it into a glaſs retort; and having fitted on a receiver, diſtil in a ſand-heat: the oil will ariſe paler coloured and leſs fetid; and a black coaly matter will remain behind. Repeat the diſtillation in freſh retorts, till the oil ceaſes to leave any fæces, and till it loſes its ill ſmell, and acquires an agreeable one.

a, The quantity of oil employed in this proceſs ſhould be conſiderable: for it leaves ſo much black matter behind in the ſeveral diſtillations, that it is reduced, at laſt, to a ſmall portion of its original quantity. The diſtillation muſt be repeated at leaſt 12 times, and frequently the requiſite ſubtilization will ſcarcely be obtained with leſs than 20 diſtillations. It is ſaid, that the effect may be expedited, by mixing the oil with quicklime into a ſoft paſte; the lime keeping down more of the groſs matter, than would remain without ſuch an addition.

b, Animal-oils thus rectified, are thin and limpid, of a ſubtle, penetrating, not diſagreeable ſmell and taſte. They are ſtrongly recommended as anodynes and antiſpaſmodics, in doſes of from 15 to 30 drops. Hoffman reports, that they procure a calm and ſweet ſleep, which continues often for 20 hours, without being followed by any languor or debility, but rather leaving the patient more alert and cheerful than before: that they procure likewiſe a gentle ſweat, without increaſing the heat of the blood: that given to 20 drops or more, on an empty ſtomach, ſix hours before the acceſſion of an intermittent fever, they frequently remove the diſorder: and that they are likewiſe a very generous remedy in inveterate and chronical epilepſies, and in convulſive motions, eſpecially if given before the uſual time of the attack, and preceded by proper evacuations.

c, The empyreumatic oils of vegetables, rectified in the ſame manner by repeated diſtillations, ſuffer a like change with the animal; loſing their dark colour and offenſive ſmell, and becoming limpid, penetrating, and agreeable: in this ſtate they are ſuppoſed, like the animal oils, to be anodyne, antiſpaſmodic, and diaphoretic or ſudorific. It is obſervable, that all the empyreumatic oils diſſolve in ſpirit of wine; and that the oftener they are rectified or re-diſtilled, they diſſolve the more readily; a circumſtance in which they differ remarkably from eſſential oils, which, by repeated diſtillations, become more and more difficult of ſolution.

d, How far theſe preparations really poſſeſs the virtues that have been aſcribed to them, has not yet been ſufficiently determined by experience; the tediouſneſs and trouble of the rectification having prevented their coming into general uſe, or being often made. They are liable alſo to a more material inconveniency in regard to their medicinal uſe, precariouſneſs in their quality: for how perfectly ſoever they be rectified, they generally loſe, in keeping, the qualities they had received from that proceſs, and return more and more towards their original fetidneſs.

SECT. VIII. *Salts and Saline Preparations.*

§ 1. FIXED ALKALINE SALTS.

637. THE aſhes of moſt vegetables, ſteeped or boiled in water, give out to it a ſaline ſubſtance, ſeparable in a ſolid form by evaporating the water. This kind of ſalt never pre-exiſts in the vegetable, but is always generated during the burning. It is called *fixed alkaline ſalt*.

638. *Salt of tartar.*

Let any kind of tartar be wrapped up in ſtrong brown paper, firſt made wet, or included in a proper veſſel, and expoſed to the fire, that its oil may be burnt out: then boil it in water, filter the ſolution, and evaporate it, till there remains a dry ſalt, which is to be kept in a veſſel cloſely ſtopped. *L.*

Take of tartar any quantity, and having wrapped it up in brown paper, or put it into a crucible, let it be ſurrounded with a gentle fire, till reduced to a coal. Having reduced this to powder, calcine it again in an open crucible, with a fire not ſufficient to melt it till the ſalt becomes white, or at leaſt aſh-coloured. Diſſolve it in water, and ſtrain thro' a linen cloth; after which it is to be evaporated in a clean iron veſſel, till all the moiſture is exhaled. Continue to keep it over the fire, till the bottom of the veſſel is almoſt red. Then put it up in glaſs bottles well ſtopped. *E.*

This ſalt has a pungent fiery taſte; and occaſions in the mouth a kind of urinous flavour, probably from the reſolution which it produces in the ſaliva. It readily diſſolves in water, and deliquiates in the air; but is not acted upon by pure vinous ſpirits. Inſtead of being diſſolved by vinous ſpirits, if a ſaturated ſolution of it in water be dropt into the pure ſpirit, it will not mix therewith, but fall diſtinct to the bottom: if water be mixed with the ſpirit, the addition of fixed alkaline ſalt will imbibe the water, and form with it, as in the other caſe, a diſtinct fluid at the bottom; this property affords a commodious method of dephlegmating vinous ſpirits, or ſeparating their watery part, as we have already ſeen.

639. Salt of tartar, or ſolutions of it in water, raiſe an efferveſcence on the admixture of acid liquors, and deſtroy their acidity, the alkali and acid uniting together into a compound of new qualities called *neutral:* earthy ſubſtances, and moſt metallic bodies, previouſly diſſolved in the acid, are precipitated from it by the alkali. The alkaline ſalt changes the colours of the blue flowers of plants, or their infuſions, to a green: it has the ſame effect on the bright red flowers, and on the colourleſs infuſions of white ones; but in many of the dark red, as thoſe of the wild poppy, and of the yellow ones, it produces no ſuch change.

640. Solutions of this ſalt liquefy all the animal juices, except milk; corrode the fleſhy parts into a kind of mucous matter; concrete with animal fats, and vegetable oils, into ſoap; and diſſolve ſulphur into a red liquor; eſpecially if aſſiſted by a boiling heat, and mingled with quicklime, which greatly promotes their activity. On pure earths and ſtones, theſe liquors have no ſenſible action; but if the earth or ſtones be mixed with four or five times the weight of the dry ſalt, and urged with a ſtrong fire, they melt along with it, and become afterwards perfectly ſoluble both in water and by the moiſture of the air: with a ſmaller proportion of the ſalt, as an equal weight, they run into an indiſſoluble glaſſy matter.

641. The medical virtues of this ſalt are, to atttenuate the juices, reſolve obſtructions, and promote the natural ſecretions. A dilute ſolution of it, drank warm in bed, generally excites ſweat: if that evacuation is not favoured, its ſenſible operation is by urine. It is an excellent remedy in coſtive habits, eſpecially if a few grains of aloes be occaſionally interpoſed; with this advantage above other purgatives and laxatives, that when the complaint is once removed, it is not apt to return. Where acidities abound in the firſt paſſages, this ſalt abſorbs the acid, and unites with it into a mild aperient neutral ſalt. As one of its principal operations is to render the animal fluids more thin, it is obvious, that where they are already colliquated, as in ſcurvies, and in all putrid diſorders in general, this medicine is improper. The common doſe of the ſalt is from two or three grains to a ſcruple; in ſome circumſtances it has been extended to a dram, in which caſe it muſt always be largely diluted with watery liquors.

642. *Salt of wormwood.*

Let aſhes of wormwood (which the ſhops are uſually ſupplied with from the country) be put into an iron pot, or any other convenient veſſel; and kept red-hot over the fire for ſome hours, often ſtirring them, that what oily matter remains may be burnt out; then boil the aſhes in water, filter the ley through paper, and evaporate it till a dry ſalt remains; which is to be kept in a veſſel cloſe ſtopt. *L.* After the ſame manner a fixed alkaline ſtill may be prepared from all thoſe vegetables which yield this kind of ſalt, *L.* as bean-ſtalks, broom, &c. *E.*

Theſe ſalts are obtained to greater advantage from dry plants than from green ones; they muſt not, however, be too dry, or too old; for in ſuch caſe, they afford but a ſmall quantity of ſalt. The fire ſhould be ſo managed, as that the ſubject may burn freely, yet not burſt into violent flame; this laſt circumſtance would greatly leſſen the yield of the ſalt; and a very cloſe ſmothering heat would have this effect in a greater degree: hence the aſhes of charcoal ſcarce yield any ſalt, whilſt the wood it was made from, if burnt at firſt in the open air, affords a large quantity.

Tachenius, Boerhaave, and others, have entertained a very high opinion of theſe oily ſalts, and endeavour as much as poſſible to retain the oil in them. They are nevertheleſs liable to a great inconvenience, uncertainty in point of ſtrength, without promiſing any advantage to counterbalance it; if the common alkalies are required to be made milder and leſs acrimonious (which is the only point aimed at in the making of theſe medicated ſalts as they are called), they may be occaſionally rendered ſo by ſuitable additions. Pure alkalies, united with a certain quantity of expreſſed oil, compoſe (as we ſhall ſee hereafter) a perfect ſoap, in which the pungent taſte of the alkaline ſalt is totally ſuppreſſed: it is obvious, therefore, that on the ſame principle the pungency may be covered in part, and this proportionably to the quantity of oily matter combined.

643. *Fixed nitre.*

Take of powdered nitre, four ounces; charcoal in powder, five drams. Mix them thoroughly together, by rubbing them in a mortar, and inject the mixture, by a little at a time, into a red-hot crucible. A deflagration, or a bright flame with a hiſſing noiſe, happens on each injection; the whole quantity being thus deflagrated, continue the fire ſtrong for half an hour.

Nitre is compoſed of the common vegetable fixed alkaline ſalt, and a peculiar acid. In this proceſs, the acid is deſtroyed, or changed to another nature; and the remaining ſalt proves merely alkaline, not different in quality from the ſalt of tartar, except that a very minute portion of the nitre generally remains unchanged; the ſalt is purified by ſolution in water, filtration, and evaporation.

644. *The alkaline ſalt of ſea-ſalt.*

Take of cubical nitre (prepared as hereafter deſcribed in § 6.) four ounces; charcoal, five drams. Mix and deflagrate as in the preceding proceſs.

a, Cubical nitre is compoſed of the nitrous acid united with the alkaline baſis of ſea-ſalt: the acid being here ſeparated in the deflagration, that alkali remains nearly pure. It poſſeſſes the general properties of the foregoing preparation; changing blue flowers, green; diſſolving oils, ſalts, and ſulphur; bringing earths and ſtones into fuſion, and forming with them, according to its quantity, either a vitreous, or a ſoluble compound; efferveſcing with acids, precipitating earths, and metals diſſolved in them, and uniting with the acid into a neutral ſalt. It differs from the foregoing alkalies, in being much milder in taſte; not ſo readily diſſolving in water; not at all deliquiating in the air; eaſily aſſuming, like neutral ſalts, a cryſtalline form; and yielding, with each of the common acids, compounds very ſenſibly different, both in their form and qualities, from thoſe which reſult from the coalition of the vegetable alkalies with the reſpective acids. The cryſtals of this ſalt itſelf are priſmatic, greatly reſembling thoſe of the ſalt called *ſal mirabile*; (ſee § 6.) Expoſed to a warm air, they fall into a porous, friable maſs, and loſe above two-thirds of their weight.

b, How far this ſalt differs in medical virtue from the other alkalies, is not well known. It apparently poſſeſſes the ſame general virtues; and, as it is far milder, may be given in more conſiderable doſes.

c. A ſalt of the ſame nature with this, but leſs pure, as containing an admixture of the common vegetable alkali, is prepared at Alicant, and ſome other places, from the aſhes of certain marine plants, called *kali*; which plants are ſuppoſed to have given riſe to the name *alkali*. The ſalt of the kali plants is called *ſoda*, or *bariglia*: it has been long uſed medicinally in France, and begins now to be introduced into practice in this country; but the above pure alkali extracted from ſea-ſalt is doubtleſs preferable to it.

645. *Ley of tartar, or oil of tartar* per deliquium.

Put any quantity of ſalt of tartar in a flat glaſs diſh, and expoſe it to the air, for ſome days, in a moiſt place: it will run into a liquor, which is either to be filtered through paper, or ſeparated from the fæces by decantation. The higher the ſalt has been calcined, the more readily will it relent in the air.

The ſolutions of fixed alkaline ſalts, effected by expoſing them to a moiſt air, are generally looked upon as being purer than thoſe made by applying water directly: for though the ſalt be repeatedly diſſolved in water, filtered, and exſiccated; yet, on being liquefied by the humidity of the air, it will ſtill depoſit a portion of earthy matter: but it muſt be obſerved, that the exſiccated ſalt leaves always an earthy matter on being diſſolved in water, as well as on being deliquiated in the air. The deliquiated lixivium is ſaid to contain nearly one part of alkaline ſalt to three of an aqueous fluid. It is indifferent, in regard to the lixivium itſelf, whether the white aſhes of tartar, or the ſalt extracted from them, be uſed: but as the aſhes leave a much greater quantity of earth, the ſeparation of the ley proves more troubleſome.

646. *Purified potaſh.* E.

Take of the lixivial ſalt, commonly called *pearl-aſhes*, any quantity; and let it be made red-hot in a crucible, that the oily matter, if any is contained in it, may be burnt out. Then powder and mix it with an equal quantity of water; let the liquor ſettle, and pour it off from the fæces. Evaporate to dryneſs in an iron veſſel. The ſalt is known to be perfectly purified, when it totally diſſolves in an equal weight of water into a liquor without ſmell or taſte.

647. *Soap leys.*

Take of Ruſſia potaſh, quicklime, of each equal weights. Gradually ſprinkle on them as much water as will ſlake the lime; then pour on more water, ſtirring the whole together, that the ſalt may be diſſolved: let the ley ſettle, pour it off into another veſſel, and, if there is occaſion, filter it. A wine pint of this ley, meaſured with the greateſt exactneſs, ought to weigh juſt 16 ounces Troy. If it proves heavier, for every dram that it exceeds this weight, add to each pint of the liquor an ounce and a half of water by meaſure: if lighter, boil it till the like quantity is waſted, or pour it upon freſh lime and aſhes. *L.*

Take of quicklime, eight ounces; purified potaſh, ſix ounces. Put the lime into a glazed earthen or iron veſſel, with 28 ounces of warm water. Add the potaſh as ſoon as the lime is ſlaked; and having mixed them well together, let the veſſel be covered till it cools, When the mixture has become cold, pour the whole into a glaſs funnel, having the pipe ſtopped with a clean linen rag. Cover the upper part of the funnel, and inſert its pipe into another glaſs veſſel, that the ley may drop from it. When it has ceaſed to drop, pour ſome ounces of water cautiouſly into the funnel, that it may lie above the thick matter. The ley will again begin to drop: and this operation is to be repeated till 32 ounces by meaſure, or 36 by weight, have paſſed through; which will take up the ſpace of two or three days. Then mix the upper and under parts of the ley together by ſhaking the veſſel, and keep it in a glaſs bottle well ſtopped. *E*,

Quicklime greatly increaſes the ſtrength of alkaline ſalts; and hence this ley is much more acrimonious, and acts more powerfully as a menſtruum on oils, fats, &c. than a ſolution of the potaſh alone; the lime ſhould be uſed freſh from the kiln; by long keeping, even in cloſe veſſels, it loſes of its ſtrength; ſuch ſhould be made choice of as is thoroughly burnt or calcined, which may be known by its comparative lightneſs.

All the inſtruments employed in this proceſs ſhould be either of wood, earthen ware, or glaſs: the common metallic ones would be corroded by the ley, ſo as either to diſcolour, or communicate diſagreeable qualities to it. If it ſhould be needful to filter or ſtrain the liquor, care muſt be taken that the filter or ſtrainer be of vegetable matter; woollen, ſilk, and that ſort of filtering paper which is made of animal ſubſtances, are quickly corroded and diſſolved by it.

The liquor is moſt conveniently weighed in a narrow-necked glaſs bottle, of ſuch a ſize, that the meaſure of a wine-pint may ariſe ſome height into its neck; the place where it reaches to, being marked with a diamond. A pint of the common leys of our ſoft-ſoap makers weighs more than 16 ounces; it has been found that their ſoap-ley will be reduced to the ſtandard here propoſed, by mixing it with ſomething leſs than an equal meaſure of water.

648. *The ſeptic ſtone, or potential cautery.* E.

Take any quantity of ſoap-ley; evaporate it over a gentle fire in a very clean iron veſſel, till the ebullition ceaſes, and the matter flows ſmooth like oil, which will happen before it is red-hot. Then pour it out on a clean iron plate, and cut it into ſlips before it grows cold; then keep it in a glaſs well ſtopped.

This preparation is a ſtrong and a ſudden cauſtic. It has an inconvenience of being apt to liquefy too much upon the part to which it is applied, ſo that it is not eaſily confined within the limits in which it is intended to operate: and indeed the ſuddenneſs of its action depends on this diſpoſition to liquefy.

649, a. *The ſtronger common cauſtic.* L.

Boil any quantity of the ſoap-leys above deſcribed, to one-fourth part: then, whilſt it continues boiling, ſome lime, that has been kept for ſeveral months in a glaſs veſſel ſtopped with a cork, is to be ſprinkled in by little and little, till it has abſorbed all the liquor, ſo as to form a kind of paſte; which keep for uſe in a veſſel very cloſely ſtopped.

Here the addition of lime in ſubſtance renders the preparation leſs apt to liquefy than the foregoing, and conſequently more eaſily confineable within the intended limits, but proportionably ſlower in its operation. The deſign of keeping the lime is, that its acrimony may be ſomewhat abated.

649, b. *The milder common cauſtic.* L.

Take of freſh quicklime, ſoft ſoap, of each equal parts. Mix them well together at the time of uſing.

This cauſtic, notwithſtanding the lime is uſed freſh, proves much milder than the former; the acrimony of the ſalt being here covered by the oil and tallow by which it is reduced into ſoap. The mild cauſtic of the Edinburgh pharmacopœia is only ſoap-ley made into a paſte with quicklime.

§ 2. VOLATILE ALKALINE SALTS.

650. As fixed alkalies are produced in the burning of vegetables, and remain behind in the aſhes; volatile ones are produced by a like degree of heat from animal ſubſtances, and riſe in diſtillation along with the other volatile principles; the admiſſion of air, neceſſary for the production of the former, is not needful for the latter. Theſe ſalts are obtainable alſo from ſome vegetable matters; and from vegetable and animal ſoot. Though a ſtrong fire is requiſite for their production, yet when once completely formed, they are diſſipated by the gentleſt warmth: in diſtillation, they riſe ſooner than the moſt highly rectified ſpirit of wine. They are produced in urine, by putrefaction, without fire; and without fire alſo they exhale from it.

651. *Spirit, ſalt, and oil of hartſhorn.* L.

Diſtil pieces of hartſhorn by a fire gradually raiſed almoſt to the higheſt: a ſpirit, ſalt, and oil, will aſcend.

If the oil be ſeparated, and the ſpirit and ſalt diſtilled again together with a very gentle heat, they will both ariſe more pure. If this be carefully repeated ſeveral times, the ſalt will become exceedingly white, the ſpirit limpid as water, and of a grateful odour.

The ſalt, ſeparated from the ſpirit, and ſublimed firſt from an equal weight of pure chalk, and afterwards from a little rectified ſpirit of wine, becomes the ſooner pure.

Calcined hartſhorn is generally made by burning the horns left after this diſtillation.

After the ſame manner, a ſpirit, ſalt, and oil, may be obtained from every kind of animal ſubſtance.

652. In the former edition of the Edinburgh diſpenſatory the following directions were given.

Put pieces of hartſhorn into a large iron pot furniſhed with an earthen head; and having fitted on a capacious receiver, and luted the junctures, diſtil in an open fire gradually increaſed. At firſt a phlegm ariſes, then a ſpirit, and afterwards a volatile ſalt, accompanied with an oil: the oil that comes over firſt is of a yellowiſh colour, but on protracting the diſtillation, there ſucceeds a reddiſh one verging to black. In the bottom of the iron pot there remains a black coal, which being burnt to whiteneſs in the open air, is called *calcined hartſhorn.*

Having poured out of the recipient all the different matters which have come over into it, they may be ſeparated from one another in the following manner; the oil ſeparates from the phlegm and ſpirit in filtration: the latter two will paſs through, and the oil remain on the filter.

The phlegm may be ſeparated from the ſpirit by diſtillation in a tall veſſel, with a gentle heat; the ſpirit will come over into the recipient, and the phlegm remain at the bottom of the diſtilling veſſel.

The ſpirit may be divided into a volatile ſalt and phlegm, by diſtilling it in a very tall and narrow cucurbit; the ſalt will ariſe, and adhere to the head in a dry form; the phlegm remaining behind.

The ſalt may be freed from the oil, by ſubliming it from twice its quantity of potaſh; for the oil is kept down by the potaſh, whilſt the ſalt ariſes.

The ſpirit alſo is rendered purer, by adding, to every pint, two ounces of potaſh, and diſtilling in a glaſs retort.

The remaining potaſh may be again purified for uſe, by calcining it in an open fire, ſo as to burn out the oil it had abſorbed from the ſalt or ſpirit.

A ſpirit, ſalt, and oil, may be obtained in the ſame manner from all the ſolid parts of animals.

653. The wholeſale dealers have very large pots for the diſtillation of hartſhorn, with earthen heads almoſt like thoſe of the common ſtill: for receivers, they uſe a couple of oil-jars, the mouths of which are luted together; the pipe that comes from the head enters the lowermoſt jar, through a hole made on purpoſe in its bottom. When a large quantity of the ſubject is to be diſtilled, it is cuſtomary to continue the operation for ſeveral days ſucceſſively; only unluting the head occaſionally to put in freſh materials.

When only a ſmall quantity of ſpirit or ſalt is wanted, a common iron pot, ſuch as is uſually fixed in ſand furnaces, may be employed, an iron head being fitted to it. The receiver ought to be large, and a glaſs, or rather tin adopter, inſerted betwixt it and the pipe of the head.

The diſtilling veſſel being charged with pieces of the horn, a moderate fire is applied, which is ſlowly increaſed, and raiſed at length almoſt to the utmoſt degree. At firſt a phlegmatic liquor ariſes; the quantity of which will be leſs or greater according as the horns were more or leſs dry: this is ſucceeded by the ſalt and oil; the ſalt at firſt diſſolves as it comes over in the phlegm, and thus forms what is called *ſpirit*: when the phlegm is ſaturated, the remainder of the ſalt concretes in a ſolid form to the ſides of the recipient. If it is required to have the whole of the ſalt ſolid and undiſſolved, the phlegm ſhould be removed as ſoon as the ſalt begins to ariſe, which may be known by the appearance of white fumes: and that this may be done the more commodiouſly, the receiver ſhould be left unluted till this firſt part of the proceſs is finiſhed. The white vapours which now ariſe ſometimes come with ſuch vehemence as to throw off or burſt the receiver: to prevent this accident, it is convenient to have a ſmall hole in the luting, which may be occaſionally ſtopped with a wooden peg, or opened as the operator ſhall find proper. After the ſalt has all ariſen, a thick dark-coloured oil comes over: the proceſs is now to be diſcontinued, and the veſſels, when grown cold, unluted.

All the liquid matters being poured out of the receiver, the ſalt which remains adhering to its ſides is to be waſhed out with a little water, and added to the reſt. It is convenient to let the whole ſtand for a few hours, that the oil may the better diſengage itſelf from the liquor, ſo as to be firſt ſeparated by a funnel, and afterwards more perfectly by filtration thro' wetted paper. The ſalt and ſpirits are then to be farther purified as above directed.

654. The ſpirit of hartſhorn met with in the ſhops is extremely precarious in point of ſtrength; the quantity of ſalt contained in it (on which its efficacy depends) varying according as the diſtillation in rectifying it is continued for a longer or ſhorter time. If after the volatile ſalt has ariſen, ſo much of the phlegm or watery part be driven over after it as is juſt ſufficient to diſſolve it, the ſpirit will be fully ſaturated, and as ſtrong as it can be made: if the proceſs is not at this inſtant ſtopped, the phlegm continuing to ariſe muſt render the ſpirit continually weaker and weaker. The diſtillation therefore ought to be diſcontinued at this period, or rather whilſt ſome of the ſalt ſtill remains undiſſolved: the ſpirit will thus prove always equal, and the buyer be furniſhed with a certain criterion of its ſtrength. Very few have taken any notice of the above-mentioned inconvenience of theſe kinds of ſpirits; and the remedy is firſt hinted at in the *pharmacopœia reformata*. The purity of the ſpirits is eaſily judged from its clearneſs and grateful odour.

655. Volatile alkaline ſalts, and their ſolutions called *ſpirits*, agree in many reſpects with fixed alkalies and their ſolutions or leys; as in changing the colour of blue flowers to a green; efferveſcing with and neutralizing acids; liquefying the animal juices, and corroding the fleſhy parts, ſo as, when applied to the ſkin, and prevented from exhaling by a proper covering, to act as cauſtics; diſſolving oils and ſulphur, though leſs readily than the fixed alkalies, on account probably of their not being able to bear any conſiderable heat, by which their activity might be promoted. Their principal difference from the other alkalies ſeems to conſiſt in their volatility: they exhale or emit pungent vapours in the coldeſt ſtate of the atmoſphere; and by their ſtimulating ſmell, they prove ſerviceable in languors and faintings. Taken internally, they diſcover a greater colliquating as well as ſtimulating power; the blood drawn from a vein, after their uſe has been continued for ſome time, being found to be remarkably more fluid than before: they are likewiſe more diſpoſed to operate by perſpiration, and to act on the nervous ſyſtem. They are particularly uſeful in lethargic caſes; in hyſterical and hypochondriacal diſorders, and in the languors, headachs, inflations of the ſtomach, flatulent colics, and other ſymptoms which attend them: they are generally found more ſerviceable to aged perſons, and in phlegmatic habits, than in the oppoſite circumſtances. In ſome fevers, particularly thoſe of the low kind, accompanied with a cough, hoarſeneſs, redundance of phlegm, and ſizineſs of the blood, they are of great utility; liquefying the viſcid juices, raiſing the *vis vitæ*, and exciting a ſalutary diaphoreſis; but in putrid fevers, ſcurvies, and wherever the maſs of blood is thin and acrimonious, they do harm. As they are more powerful than the fixed in liquefying ſizy blood and tenacious humours, ſo they prove more hurtful where the fluids are already in a colliquated ſtate. In vernal intermittents, particularly thoſe of the ſlow kind, and where the blood is denſe or ſizy, they are often the moſt efficacious remedy. Mr Biſſet obſerves, in his Eſſay

on the medical conſtitution of Great Britain, that tho' many caſes occur which will yield to no other medicine than the bark, yet he has met with a pretty many that were only ſuppreſſed from time to time by the bark, but were completely cured by alkaline ſpirits: that theſe ſpirits will often carry off vernal intermittents without any previous evacuation; but that they are generally more effectual if a purge is premiſed: and in plethoric or inflammatory caſes, or where the fever perſonates a remittent, venæſection.

Theſe ſalts are moſt commodiouſly taken in a liquid form, largely diluted; or in that of a bolus, which ſhould be made up only as it is wanted. The doſe is from a grain or two to ten or twelve. Ten drops of a well made ſpirit, or ſaturated ſolution, are reckoned to contain about a grain of the ſalt. In intermittents, fifteen or twenty drops of the ſpirit are given in a tea-cup full of cold ſpring-water, and repeated five or ſix times in each intermiſſion.

656. The volatile ſalts and ſpirits prepared from different animal ſubſtances, have been ſuppoſed capable of producing different effects upon the human body, and to receive ſpecific virtues from the ſubject. The ſalt of vipers has been eſteemed particularly ſerviceable in the diſorders occaſioned by the bite of that animal; and a ſalt drawn from the human ſcull, in diſeaſes of the head. But modern practice acknowledges no ſuch different effects from theſe preparations, and chemical experiments have ſhewn their identity. There is indeed, when not ſufficiently purified, a very perceptible difference in the ſmell, taſte, degree of pungency, and volatility of theſe ſalts; and in this ſtate their medicinal virtues vary conſiderably enough to deſerve notice; but this difference they have in common, according as they are more or leſs loaded with oil, not as they are produced from this or that animal ſubſtance. As firſt diſtilled, they may be looked uopn as a kind of volatile ſoap, in which the oil is the prevailing principle; in this ſtate they have much leſs of the proper alkaline acrimony and pungency than when they have undergone repeated diſtillations, and ſuch other operations as diſengage the oil from the ſalt; for by theſe means they loſe their ſaponaceous quality, and, acquiring greater degrees of acrimony, become medicines of a different claſs. Theſe preparations, therefore, do not differ near ſo much from one another as they do from themſelves in different ſtates of purity. To which may be added, that when we conſider them as loaded with oil, the virtues of a diſtilled animal-oil itſelf are likewiſe to be brought into the account.

Theſe oils, as firſt diſtilled, are highly fetid and offenſive, of an extremely heating quality, and of ſuch activity, that, according to Hoffman's account, half a drop, diſſolved in a dram of ſpirit of wine, is ſufficient to raiſe a copious ſweat. By repeated rectifications, they loſe their offenſiveneſs, and at the ſame time become mild in their medicinal operation: the rectified oils may be given to the quantity of twenty or thirty drops, and are ſaid to be anodyne and antiſpaſmodic, to procure a calm ſleep and gentle ſweat, without heating or agitating the body. It is obvious, therefore, that the ſalts and ſpirits muſt differ, not only according to the quantity of oil they contain, but according to the quality of the oil itſelf in its different ſtates.

The volatile ſalts and ſpirits, as firſt diſtilled, are of a brown colour, and a very offenſive ſmell: by repeated rectification, as directed in the proceſſes above ſet down, they loſe great part of the oil on which theſe qualities depend, the ſalt becomes white, the ſpirit limpid as water, and of a grateful odour; and this is the mark of ſufficient rectification.

It has been objected to the repeated rectification of theſe preparations, that by ſeparating the oil, it renders them ſimilar to the pure ſalt and ſpirit of ſal ammoniac, which are procurable at an eaſier rate. But this is by no means the caſe. The intention is not to purify them wholly from the oil, but to ſeparate the groſſer part, and to ſubtilize the reſt, ſo as to bring it towards the ſame ſtate as when the oil is rectified by itſelf. Dr Lewis has repeated the rectification of ſpirit of hartſhorn twenty times ſucceſſively, and found it ſtill to participate of oil, but of an oil very different from what it was in the firſt diſtillation.

The rectified oils, in long keeping, become again fetid. The ſalts and ſpirits alſo, however carefully rectified, ſuffer, in length of time, the ſame change; reſuming their original brown colour and ill ſmell; a proof that the rectification is far from having diveſted them of oil.

657. *Spirit, ſalt, and oil of ſoot.* L.

Diſtil ſoot after the ſame manner as directed above for hartſhorn: but here more labour is required to render the ſpirit and ſalt pure.

The volatile ſalt and ſpirit of ſoot are, when ſufficiently purified, not different in quality from thoſe of animal ſubſtances; though ſome have preferred them in nervous complaints, particularly in epileptic caſes.

658. *The volatile ſalt and ſpirit of ſal ammoniac.*

Take a pound and a half of any fixed alkaline ſalt, a pound of ſal ammoniac, and four pints of water. Diſtil off, with a gentle heat, two pints of ſpirit. The volatile ſalt is made from a pound of ſal ammoniac mixed with two pounds of pure chalk, and ſet to ſublime in a retort with a ſtrong fire. *L.*

Take ſal ammoniac, and purified potaſhes, each one pound; water, a pint and an half; diſtil to dryneſs. *E.*

The volatile ſalt and ſpirit of ſal ammoniac are the pureſt of all the medicines of this kind. They are ſomewhat more acrimonious than thoſe produced directly from animal-ſubſtances, which always contain a portion of the oil of the ſubject, and receive from thence ſome degree of a ſaponaceous quality. Theſe laſt may be reduced to the ſame degree of purity, by combining them with acids into ammoniacal ſalts; and afterwards recovering the volatile alkali from theſe compounds by the proceſſes above directed.

659. The matter which remains in the retort, after the diſtillation of the ſpirit, and ſublimation of the ſalt of ſal ammoniac, is found to conſiſt of marine acid united with the fixed alkali or chalk employed. When fixed alkaline ſalt has been uſed as the intermedium, the reſiduum, or *caput mortuum*, as it is called, yields, on ſolution and cryſtallization, a ſalt exactly ſimilar to the *coagulated ſpirit of ſea-ſalt* hereafter deſcribed. And hence we may judge of the extraor-

traordinary virtues formerly attributed to this ſalt, under the names of *ſal antihyſtericum, antihypochondriacum, febrifugum, digeſtivum ſylvii*, &c.

660. The caput mortuum of the volatile ſalt, where chalk is employed as an intermedium, expoſed to a moiſt air, runs into a pungent liquor, which proves nearly the ſame with a ſolution of chalk made directly in the marine acid: it is called by ſome *oleum cretæ*, "oil of chalk." If calcined ſhells, or other animal-limes, be mingled with ſal ammoniac, a maſs will be obtained, which likewiſe runs in the air, and forms a liquor of the ſame kind. This liquor ſeems to be the ſecret of ſome pretenders to a diſſolvent of the calculus.

661. *Volatile cauſtic ſpirit.*

Take of ſal ammoniac, one pound; quicklime, a pound and a half; water, four pints. Quench the lime in the water; and having put this mixture into a retort, add to it the powdered ſalt. Immediately adapt a recipient, and with a very gentle heat draw off two pints.—The Edinburgh college order a pound of quicklime, with only eight ounces of ſal ammoniac, and as much water. The lime is ſlaked with the water; then ground with the ſalt, and diſtilled.

This ſpirit is commonly called, from the intermedium, *ſpirit of ſal ammoniac with quicklime*. The effect of the quicklime on the ſal ammoniac, is very different from that of the chalk and fixed alkali in the foregoing proceſs. Immediately on mixture, a very penetrating vapour exhales; and in diſtillation, the whole of the volatile ſalt ariſes in a liquid form; no part of it appearing in a concrete ſtate, how gently ſoever the liquor be rediſtilled. This ſpirit is far more pungent than the other both in ſmell and taſte; and, like fixed alkalies rendered cauſtic by the ſame intermedium, it raiſes no efferveſcence on the admixture of acids.

This ſpirit is held too acrimonious for internal uſe, and has therefore been chiefly employed for ſmelling to in faintings, &c. though, when properly diluted, it may be given inwardly with ſafety. It is an excellent menſtruum for ſome vegetable ſubſtances, as Peruvian bark, which the other ſpirit extracts little from.

§ 3. COMBINATION of ALKALIES with OILS and INFLAMMABLE SPIRITS.

662. *Almond ſoap.* L.

TAKE any qantity of freſh-drawn oil of almonds, and thrice its quantity by meaſure of the foregoing ſoap leys. Digeſt them together in ſuch a heat, that they may but juſt boil or ſimmer, and in a few hours they will unite: after which, the liquor in boiling, will ſoon become ropy, and in good meaſure tranſparent; a little of it ſuffered to cool, will appear like gelly. When this happens, throw in by little and little ſome common ſalt, till the boiling liquor loſes it ropineſs; and continue the coction, till, on receiving ſome drops on a tile, the ſoap is found to coagulate, and the water freely ſeparates from it. The fire being then removed, the ſoap will gradually ariſe to the ſurface of the liquor; take it off before it grow cold, and put it into a wooden mould or frame, which has a cloth for its bottom: afterwards take out the ſoap, and ſet it by till ſufficiently dried. After the ſame manner, a ſoap may likewiſe be made with oil-olive; but the pureſt oil muſt be uſed, that the ſoap may be as little ungrateful as poſſible either to the palate or ſtomach.

This proceſs is ſo fully deſcribed, as to render any further directions unneceſſary. The general virtues of ſoap have been already mentioned in the *Table* of MATERIA MEDICA; that prepared after this manner is not different in quality from the hard ſort there mentioned.

663. *Purified ſoap.*

Slice one pound of dry, hard, Genoa, Alicant, or any other oil-ſoap, into a clean pewter veſſel, and pour upon it two gallons of rectified ſpirit of wine. Place the veſſel in a water-bath, and apply ſuch a degree of heat as may make the ſpirit boil, when it will ſoon diſſolve the ſoap. Let the veſſel ſtand cloſe covered in a warm place, till the liquor has grown perfectly clear; if any oily matter ſwim upon the ſurface, carefully ſcum it off. Then decant the limpid liquor from the fæces, and diſtil off from it all the ſpirit that will ariſe in the heat of a water-bath. Expoſe the remainder to a dry air for a few days, and it will become a white, opake, and ſomewhat friable maſs.

Soap thus purified has little or no ſmell; and proves, upon examination, not in any degree acrimonious, but quite mild and ſoft, and conſequently well fitted for medicinal purpoſes.

664, a. *Saponaceous lotion.* L.

Take of roſe-water, three quarters of a pint; oil-olive, one quarter of a pint; ley of tartar, half an ounce by meaſure. Grind the ley of tartar and the oil together, until they unite; then gradually add the roſe water.

This is deſigned for external uſe, as a detergent waſh; and, like other ſoapy liquors, anſwers this purpoſe very effectually. Where it is required to be more deterſive, it may be occaſionally rendered ſo by the addition of a ſmall quantity of a ſolution of any fixed alkaline ſalt.

664, b. *Saponaceous liniment.* L.

Take of ſpirit of roſemary, one pint; hard Spaniſh ſoap, three ounces; camphor, one ounce. Digeſt the ſoap in the ſpirit of roſemary, until it is diſſolved; then add the camphor.

This compoſition alſo is employed chiefly for external purpoſes, againſt rheumatic pains, ſprains, bruiſes, and other like complaints. Soap acts to much better advantage, when thus applied in a liquid form, than in the ſolid one of a plaſter.

665. *Anodyne balſam, commonly called* Bates's balſam. E.

Take of white ſoap, five ounces; crude opium, an ounce; camphor, two ounces; eſſential oil of roſemary, half an ounce; rectified ſpirit of wine, two pints. Digeſt the ſpirit with the ſoap and opium, in a gentle ſand-heat, for three days; then ſtrain the liquor, and add to it the camphor and eſſential oil.

This compoſition is greatly commended for allaying pains, and it is ſaid to have been ſometimes uſed with benefit even in the gout; a cloth dipt in it being laid on the part. It is ſometimes likewiſe directed to be taken inwardly in the ſame diſorder, as alſo in nervous colics, jaundice, &c. from twenty to fifty drops or more; though ſurely, in gouty caſes, the uſe of opiate medicines requires great caution. One grain of opium is contained in about ninety drops of the balſam.

666. *Saponaceous balſam, commonly called* opodeldoc.

This is exactly the ſame with the foregoing; omitting only the opium. *E.*

667. *Dulcified ſpirit of ſal ammoniac.* L.

Take half a pound of any fixed alkaline ſalt, four ounces of ſal ammoniac, and three pints of proof-ſpirit of wine. Diſtil off, with a gentle heat, a pint and a half.

This ſpirit has lately come much into eſteem, both as a medicine and a menſtruum. It is a ſolution of volatile ſalt in rectified ſpirit of wine; for though proof-ſpirit is made uſe of, its phlegmatic parts does not ariſe in the diſtillation, and ſerves only to facilitate the action of the pure ſpirit upon the ammoniacal ſalt. Rectified ſpirit of wine does not diſſolve volatile alkaline ſalts by ſimple mixture: on the contrary, it precipitates them, as has been already obſerved, when they are previouſly diſſolved in water; but by the preſent proceſs, a conſiderable proportion of the volatile alkali is combined with the ſpirit. It might perhaps, for ſome purpoſes, be more adviſable, to uſe in this intention the volatile ſpirit made with quicklime; for this may be mixed at once with the rectified ſpirit of wine, in any proportions, without the leaſt danger of any ſeparation of the volatile alkali: And accordingly the Edinburgh college have now ordered this ſpirit to be made by mixing four ounces cauſtic ſpirit of ſal ammoniac with eight of ſpirit of wine.

668. *The volatile fetid ſpirit.* L.

Take of any fixed alkaline ſalt, a pound and a half; ſal ammoniac, one pound; aſafœtida, four ounces; proof-ſpirit of wine, ſix pints. Draw off with a gentle heat, five pints.

669. *Fetid volatile ſpirit.* E.

Take of vinous ſpirit of ſal ammoniac, eight ounces; aſafœtida, half an ounce. Digeſt 12 hours in a cloſe veſſel; then diſtil eight ounces in a water-bath.

This ſpirit is deſigned as an antihyſteric, and is undoubtedly a very elegant one.

670. *Volatile aromatic ſpirit.* L.

Take of eſſential oil of nutmegs, eſſence of lemons, each two drams; eſſential oil of cloves, half a dram; dulcified ſpirit of ſal ammoniac, one quart. Diſtil them with a very gentle fire.

671. *Volatile oily ſpirit, commonly called* ſaline aromatic ſpirit. E.

Take of vinous ſpirit of ſal ammoniac, eight ounces; eſſential oil of roſemary, one dram and a half; eſſence of lemon-peel, a dram. Mix the whole together. Draw off by diſtillation, in the heat of a water-bath, near one gallon.

Volatile ſalts thus united with aromatics, are not only more agreeable in flavour, but likewiſe more acceptable to the ſtomach, and leſs acrimonious, than in their pure ſtate. Both the foregoing compoſitions turn out excellent ones, provided the oils are good, and the diſtillation ſkilfully performed. The doſe is from five or ſix drops to ſixty or more.

§. 4. ACID SPIRITS.

672. *Weak ſpirit and the ſtrong ſpirit (or oil,) of vitriol, and colcothar.* L.

Let calcined vitriol be diſtilled in earthen veſſels, with reverberatory fire, for three days without intermiſſion. What remains in the veſſels is called *colcothar* of vitriol. Put the diſtilled liquor into a glaſs retort, and place it in a ſand furnace: the weak ſpirit will come over, the ſtrong (improperly called *oil* of vitriol) remaining behind.

This proceſs, was never practicable to advantage without a very large apparatus, and is now entirely ſuperſeded by the much cheaper method of preparing the acid from ſulphur.

The acid ſpirit, as it ariſes in the firſt diſtillation, appears of a dark or blackiſh colour, and contains a conſiderable portion of phlegm. In the ſecond diſtillation, the phlegmatic parts ariſe firſt, together with the lighter acid, which are kept apart under the name of *weak ſpirit:* at the ſame time, the remaining ſtrong ſpirit, or *oil* as it is called, loſes its black colour, and becomes clear; and this is the uſual mark for diſcontinuing the diſtillation.

673. The ſpirit of vitriol is the moſt ponderous of all the liquids we are acquainted with; and the moſt powerful of the acids. If any other acid be united with a fixed alkaline ſalt or earth; upon the addition of the vitriolic, ſuch acid will be diſlodged, and ariſe on applying a moderate heat, leaving the vitriolic in poſſeſſion of the alkali; though without this addition it would not yield to the moſt vehement fire. In medicine it is employed chiefly as ſubſervient to other preparations: it is likewiſe not unfrequently mixed with juleps and the like, in ſuch quantity as will be ſufficient to give the liquor an agreeable tartneſs in the intentions of a cooling antiſeptic, reſtringent, and ſtomachic.

674. *Sulphurated water, commonly called* gas ſulphuris. L.

Take a quart of water, and half a pound of ſulphur. Let part of the ſulphur be ſet on fire in an iron ladle, and ſuſpended over the water in a cloſe veſſel: as ſoon as the fumes ſubſide, ſome more of the ſulphur is to be fired in the ſame manner; and this repeated till the whole quantity is burnt.

This preparation is ſaid to give relief in fits of the convulſive aſthma. It is taken to the quantity of a ſpoonful or half an ounce, two or three times a day, in any ſuitable vehicle.

675. *Glauber's ſpirit of nitre.*

Take three pounds of nitre, and one pound of the ſtrong ſpirit or oil of vitriol. Mix them cautiouſly and gradually together under a chimney; and then diſtil at firſt with a gentle, and afterwards with a ſtronger heat. *L.*

Put two pounds of nitre into a glaſs retort; and add by degrees one pound of oil of vitriol diluted with an equal quantity of warm water. Diſtil in a ſand-heat, gradually increaſed, till the matter remains dry.—This ſpirit is rectified by a ſecond diſtillation with the heat of a water-bath, in a glaſs cucurbit, with its head and receiver; the phlegm ariſes, leaving the ſpirit behind. *E.*

The acid of nitre is next in ſtrength to the vitriolic, and diſlodges all but that from alkaline ſalts or earths. It differs from all the other acids in deflagrating with inflammable matters: if a ſolution of any inflammable ſubſtance, as hartſhorn, &c. in this acid be ſet to evaporate; as ſoon as the matter approaches to dryneſs, a violent detonation enſues. The chief uſe of this acid is as a menſtruum for certain minerals, and as the baſis of ſome particular preparations, of which hereafter. It has been given likewiſe diluted, with any convenient vehicle, as a diuretic, from 10 to 50 drops.

676. *Glauber's ſpirit of ſea-ſalt.*

Two pounds of ſea-ſalt, and the ſame quantity of ſtrong ſpirit or oil of vitriol. Dilute the acid ſpirit with a pint of water, and pour this mixture, by little and little, on the ſalt under a chimney; then diſtil, at firſt with a gentle, and afterwards with a ſtronger fire. *L.*

The ſpirit of ſea-ſalt is the weakeſt of the mineral acids, but ſtronger than any of the vegetable; it requires a greater fire to diſtil it than that of nitre, yet is more readily diſſipated by the action of the air. It is uſed chiefly as a menſtruum for the making of other preparations; ſometimes likewiſe it is given, properly diluted, as an antiphlogiſtic, aperient, and diuretic, from 10 to 60 or 70 drops.

677. *Aqua fortis.* L.

Take of nitre, green vitriol uncalcined, each three pounds; the ſame vitriol calcined, one pound and a half. Mix them well together, and diſtil with a very ſtrong fire, as long as any red vapour ariſes. *L*

Here the direction of thoroughly mixing the ingredients ought to be well attended to, for if this is neglected, or but ſlightly performed, the due quantity of acid will not be obtained. The produce of theſe proceſſes is a ſpirit of nitre containing ſo much more phlegm, or watery moiſture, than Glauber's ſpirit, as the vitriol employed in its preparation does more than an equivalent quantity of oil of vitriol.

The great demand which there is in ſundry buſineſſes for aquafortis has occaſioned the preparation of it to become a trade by itſelf. Hence larger and leſs expenſive inſtruments than thoſe mentioned above, have been contrived. The common diſtilling veſſel is a large iron pot, with an earthen, or ſtone-ware ſtill-head, to which is adapted a large glaſs globe, or elſe a jar made of the ſame kind of clay as the head. The workmen are not at the trouble either of drying the vitriol, or pounding the nitre, but throw them both promiſcuouſly into the pot, where the fire ſoon liquefies and mixes them together. The aquafortis prepared after this manner is extremely impure, and utterly unfit for many purpoſes, ſuch in particular are the ſolutions of mercury and of ſilver; the violence of the fire, employed in the operation, never fails to elevate ſome of the metallic parts of the vitriol; the nitre is uſed rough or unrefined, which containing a portion of ſea-ſalt, ſends over ſome of the marine along with the nitrous acid; nor are the ingredients free from bits of wood, or other vegetable matters, which burning in the proceſs foul the ſpirit with an empyreumatic oil, giving it, at the ſame time, an high colour. If therefore common aquafortis be employed in any medicinal preparation, it ought to be previouſly purified: the moſt effectual method of doing which is the following.

678. *Purified aquafortis.*

Drop into the aquafortis a drop or two of ſolution of ſilver. If it becomes miky or cloudy, drop in a little more of the ſolution, till a freſh addition occaſions no further change; allowing proper intervals for the white matter to ſettle, that the effect of a new addition may be the better perceived. Then pour the liquor into a glaſs retort, and diſtil in a ſand-heat to dryneſs.

The milkineſs produced by the ſolution of ſilver is a certain mark of marine or vitriolic acid in the aquafortis; the ſilver abſorbing thoſe acids, and forming with them a concrete which the liquor is incapable of holding diſſolved. If the aquafortis is not made at all cloudy by this ſolution, we may be certain of its having been previouſly free from the leaſt admixture of thoſe heterogeneous acids; and when it ceaſes to become milky from a freſh addition, we may be equally certain, that how much ſoever it might have contained of them at firſt, they are now perfectly ſeparated.

The ſolution of ſilver is to be made in aquafortis already purified. Where this cannot be had, the little quantity generally ſufficient for the preſent purpoſe, may be made in the common impure ſort of aquafortis, which will be purified during the diſſolution itſelf. Put a thin bit of ſilver into a little of the aquafortis, and ſet the vial in a ſand-heat; if the aquafortis is pure, numerous minute bubbles will iſſue from the ſilver on all ſides, and the metal will gradually diſſolve without altering the tranſparency of the liquor; but if the aquafortis contains marine or vitriolic acid, it will quickly become milky, thoſe acids uniting with the ſilver, as in the above proceſs, as faſt as the nitrous acid diſſolves it. As the white matter precipitates upon, and adheres to, the ſurface of the ſilver, ſo as to impede the further action of the menſtruum; the liquor muſt be filtered, and treated in the ſame manner with a bit of freſh ſilver: if any milkineſs ſtill enſues, the operation muſt be repeated with another piece of the metal, till all the foreign acids are ſeparated, and the ſilver is found to diſſolve clear. Good aquafortis takes up about half its own weight of ſilver.

Inſtead of all theſe operoſe preparations, however, the Edinburgh college now order only a weak nitrous acid, compoſed of equal parts of ſtrong ſpirit of nitre and water.

679. *Diſtilled vinegar, or ſpirit of vinegar.*

Let vinegar be diſtilled with a gentle heat as long as the drops fall free from an empyreuma. If ſome part of the ſpirit which comes over firſt be thrown away, the reſt will be the ſtronger. *L.*

Diſtil a gallon of vinegar in glaſs veſſels, throwing away the firſt two pounds of produce. The next four pounds are to be kept as ſpirit of vinegar; and the remainder, as being empyreumatic, kept for other purpoſes. *E.*

680. This proceſs may be performed either in a common

mon ſtill with its head, or in a retort. The better kinds of wine-vinegar ſhould be made uſe of: thoſe prepared from malt-liquors, however fine and clear they may ſeem to be, contain a large quantity of a viſcous ſubſtance, as appears from the ſlimineſs and ropineſs to which they are very much ſubject; this not only hinders the acid parts from ariſing freely, but likewiſe is apt to make the vinegar boil over into the recipient, and at the ſame time diſpoſes it to receive a diſagreeable impreſſion from the fire. And indeed, with the beſt kind of vinegar, if the diſtillation be carried on to any great length, it is extremely difficult to avoid an empyreuma. The beſt method of preventing this inconvenience is, if a retort be made uſe of, to place the ſand but a little way up its ſides; and, when ſomewhat more than half the liquor is come over, to pour on the remainder a quantity of freſh vinegar equal to that of the liquor drawn off: this may be repeated three or four times; the vinegar ſupplied at each time being previouſly made hot: the addition of cold liquor would not only prolong the operation, but alſo endanger breaking the retort. If the common ſtill is employed, it ſhould likewiſe be occaſionally ſupplied with freſh vinegar, in proportion as the ſpirit runs off; and this continued, until the proceſs can be conveniently carried no farther: the diſtilled ſpirit muſt be rectified by a ſecond diſtillation in a retort; or glaſs alembic; for though the head and receiver be of glaſs or ſtone-ware, the acid will contract a metallic taint from the pewter worm.

The reſiduum of this proceſs is commonly thrown away as uſeleſs, though, if ſkilfully managed, it might be made to turn to good account; the moſt acid parts of the vinegar ſtill remaining in it. Mixed with about three times its weight of fine dry ſand, and committed to diſtillation in a retort, with a well-regulated fire, it yields an exceeding ſtrong acid ſpirit, together with an empyreumatic oil, which taints the ſpirit with a diſagreeable odour. This acid is nevertheleſs, without any rectification, better for ſome purpoſes (as a little of it will go a great way) than the pure ſpirit; particularly for making the ſal diureticus of the London diſpenſatory; for there the oily matter, on which its ill flavour depends, is burnt out by the calcination.

681. The ſpirit of vinegar is a purer and ſtronger acid than vinegar itſelf, with which it agrees in other reſpects. The medical virtues of theſe liquors may be ſeen in the *Table* of MATERIA MEDICA. Their principal difference from the mineral acids conſiſts in their being milder, leſs ſtimulating, leſs diſpoſed to affect the kidneys and promote the urinary ſecretions, or to coagulate the animal juices.

§ 5. COMBINATION of ACID with VINOUS SPIRIT.

682. ALL the mineral acids, on being mixed with ſpirit of wine, raiſe a great ebullition and heat. If the acid is in a ſmall quantity, it unites intimately with the vinous ſpirit, ſo as to ariſe with it in diſtillation. The taſte and all the characters of acidity are deſtroyed; and the mixture acquires a grateful flavour, which neither of the ingredients had before.

683. *Vitriolic ether.* E.

Take of rectified ſpirit of wine, 32 ounces by weight; oil of vitriol, one pound. Put the ſpirit into a glaſs retort capable of bearing a ſudden heat, and pour in the acid in a continued ſtream. Mix the two together by agitating them gently, but frequently; diſtil immediately in a ſand-bath previouſly made hot, into a receiver cooled with water or ſnow. The fire in the mean time muſt be regulated in ſuch a manner that the liquor muſt begin to boil as ſoon as poſſible, and continue to do ſo till 16 ounces by weight have come over. To the diſtilled liquor add two drams of the ſharpeſt common cauſtic; then diſtil again out of a very high retort, and with a very gentle heat, into a very cold receiver, till 10 ounces by weight have come over.

684. *Dulcified ſpirit of vitriol.*

Mix two parts by weight of rectified ſpirit of wine with one part of vitriolic ether. *E.*

Take of the ſtrong ſpirit or oil of vitriol, one pound; of rectified ſpirit of wine, one pint. Cautiouſly mix them together by little and little at a time, and diſtil the mixture, with a very gentle heat, till a black froth begins to ariſe: then immediately remove the whole from the fire, leſt this froth ſhould paſs over into the recipient, and fruſtrate the operation. L.

When the method of making this ſpirit recommended by the London pharmacopœia is adopted, a good deal of caution is requiſite in mixing the two liquors. Some direct the ſpirit of wine to be put firſt into the retort, and the oil of vitriol to be poured upon it all at once; a method of procedure by no means adviſeable, as a violent heat and ebullition always enſue, which not only diſſipate a part of the mixture, but hazard alſo the breaking of the veſſel, to the great danger of the operator. Others put the oil of vitriol into the retort firſt; then by means of a funnel, with a long pipe that may reach down juſt to the ſurface of the acid, pour in the ſpirit of wine: if this is done with ſufficient caution, the vinous ſpirit ſpreads itſelf on the ſurface of the oil of vitriol, and the two liquors appear diſtinct: on ſtanding for a week or two, the vinous ſpirit is gradually imbibed without any commotion, and the veſſel may then be ſafely ſhaken, to complete the mixture; but if the ſpirit is poured in too haſtily at firſt, or if the veſſel is moved before the two liquors have in ſome degree incorporated, the ſame effect enſues as in the foregoing caſe. The moſt ſecure way is, to add the oil of vitriol to the ſpirit of wine by a little quantity at a time, waiting till the firſt addition is incorporated before another quantity is put in: by this management, the heat that enſues is inconſiderable, and the mixture is effected without any inconvenience.

The diſtillation ſhould be performed with an equable and very gentle heat, and not continued ſo long as till a black froth begins to appear; for before this time a liquor will ariſe of a very different nature from the ſpirit here intended. The ſeveral products are moſt commodiouſly kept apart by uſing a tubulated receiver, ſo placed, that its pipe may convey the matter which ſhall come over into a vial ſet underneath; the juncture of the retort and recipient is to be luted with a paſte made of linſeed meal, and further ſecured by a piece of wet bladder: the lower juncture may be cloſed only with ſome ſoft wax, that the vial may be occaſionally removed with eaſe.

The true ducified ſpirit ariſes in thin ſubtile vapours, which condenſe upon the ſides of the recipient in ſtraight ſtriæ. It is colourleſs as water, very volatile, inflammable, of an extremely fragrant ſmell, in taſte ſomewhat aromatic.

After the fire has been kept up for ſome time, white fumes ariſe, which either form irregular ſtriæ, or are collected into large round drops like oil: on the firſt appearance of theſe, the vial (or the receiver, if a common one is made uſe of) muſt be taken away. If another be ſubſtituted, and the diſtillation continued, an acid liquor comes over of an exceeding pungent ſmell, like the fumes of burning brimſtome. At length a black froth begins haſtily to ariſe, and prevents our carrying the proceſs further.

On the ſurface of the ſulphureous ſpirit is found ſwimming a ſmall qunatity of oil, of a light yellow colour, a ſtrong, penetrating, and very agreeable ſmell. This oil ſeems to be nearly of the ſame nature with the eſſential oils of vegetables. It readily and totally diſſolves in rectified ſpirit of wine, and communicates to a large quantity of that menſtruum the taſte and ſmell of the aromatic or dulcified ſpirit.

The matter remaining after the diſtillation is of a dark blackiſh colour, and ſtill highly acid. Treated with freſh ſpirit of wine, in the ſame manner as before, it yields the ſame productions; till at length, all the acid that remains unvolatilized being ſatiated with the inflammable oily matter of the ſpirit, the compound proves a bituminous, ſulphureous maſs: which, expoſed to the fire in open veſſels, readily burns, leaving a conſiderable quantity of fixed aſhes; in cloſe ones, explodes with violence; and with fixed alkaline ſalts, forms a compound nearly ſimilar to one compoſed of alkalies and ſulphur.

Dulcified ſpirit of vitriol has been for ſome time greatly eſteemed both as a menſtruum and a medicine. It diſſolves ſome reſinous and bituminous ſubſtances more readily than ſpirit of wine alone, and extracts elegant tinctures from ſundry vegetables; eſpecially if rectified, from a little fixed alkaline ſalt, to ſeparate any redundant acidity. As a medicine, it promotes perſpiration and the urinary ſecretion, expels flatulencies, and in many caſes abates ſpaſmodic ſtrictures, eaſes pains, and procures ſleep: the doſe is from 10 to 80 or 90 drops in any convenient vehicle. It is not eſſentially different from the celebrated anodyne liquor of Hoffman; to which it is, by the author himſelf, not unfrequently directed as a ſuccedaneum.

The ether or ethereal ſpirit is the lighteſt, moſt volatile, and inflammable, of all known liquids. It is lighter than the moſt highly rectified ſpirit of wine, in the proportion of about ſeven to eight: a drop let fall on the hand evaporates almoſt in an inſtant, ſcarcely rendering the part moiſt. It does not mix, or only in a ſmall quantity, with water, ſpirit of wine, alkaline lixivia, volatile alkaline ſpirits, or acids; but is a powerful diſſolvent for oils, balſams, reſins, and other analogous ſubſtances. Its medical effects are not as yet much known, though it is not to be doubted that a fluid of ſo much ſubtlety muſt have conſiderable ones. It has often been found to give eaſe in violent headachs, by being applied externally to the part; and to relieve the toothach, by being laid on the afflicted jaw. It has been given alſo internally, with benefit, in whooping coughs and hyſterical caſes, from two or three drops to five and twenty, in a glaſs of wine or water, which ſhould be ſwallowed as quick as poſſible, as the ether ſo ſpeedily exhales.

685. *Dulcified ſpitre of nitre.*

Take a quart of rectified ſpirit of wine, and half a pound of Glauber's ſpirit of nitre. Mix them, by pouring the nitrous ſpirit into the other; and diſtil with a gentle heat, as long as the liquor which comes over does not raiſe any efferveſcence with lixivial ſalts. *L.*

Put three parts of rectified ſpirit of wine into a large bolt-head, and gradually add thereto one part of ſpirit of nitre. Digeſt them together for ſeven days, and then diſtil in a water-bath as long as any ſpirit comes over. *E.*

Here the operator muſt take care not to invert the order of mixing the two liquors, by pouring the vinous ſpirit into the acid; for if he ſhould, a violent effervеſcence and heat would enſue, and the matter be diſperſed in highly noxious red fumes. The moſt convenient and ſafe method of performing the mixture ſeems to be, to put the inflammable ſpirit into a large glaſs body with a narrow mouth, placed under a chimney, and to pour upon it the acid by means of a glaſs funnel, in very ſmall quantities at a time; ſhaking the veſſel as ſoon as the effervеſcence enſuing upon each addition ceaſes, before a freſh quantity is put in: by this means the glaſs will heat equally, and be prevented from breaking. During the action of the two ſpirits upon one another, the veſſel ſhould be lightly covered; if cloſe ſtopped, it will burſt; and if left entirely open, ſome of the more valuable parts will exhale.

The liquors, mixed together, ſhould be ſuffered to reſt for at leaſt twelve hours, that the fumes may entirely ſubſide, and the union be in ſome meaſure completed. The diſtillation ſhould be performed with a very ſlow and well regulated fire; otherwiſe the vapour will expand with ſo much force as to burſt the veſſels. Wilſon ſeems to have experienced the juſtneſs of this obſervation; and hence directs the juncture of the retort and receiver not to be luted, or but ſlightly; if a tubulated recipient, with its upright long pipe, be made uſe of, and the diſtillation performed with the heat of a water-bath, the veſſels may be luted without any danger. This method has likewiſe another advantage, as it aſcertains the time when the operation is finiſhed. Examining the diſtilled ſpirit every now and then with alkaline ſalts, as directed above, is ſufficiently troubleſome; whilſt in a water-bath we may ſafely draw over all that will ariſe, for this heat will elevate no more of the acid than what is dulcified by the vinous ſpirit.

Dulcified ſpirit of nitre has been long held, and not undeſervedly, in great eſteem. It quenches thirſt, promotes the natural ſecretions, expels flatulencies, and moderately ſtrengthens the ſtomach: it may be given from twenty drops to a dram in any convenient vehicle. Mixed with a ſmall quantity of ſpirit of hartſhorn, the *ſpiritus volatilis aromaticus*, or any other alkaline ſpirit, it proves a mild yet efficacious diaphoretic, and often notably diuretic; eſpecially in ſome febrile caſes, where ſuch a ſalutary evacuation is wanted. A ſmall proportion of this ſpirit added to malt-ſpirits, gives them a flavour approaching to that of French brandy.

§ 6. Neutral Salts.

686. When any acid and any alkaline ſalts are mixed together, in ſuch proportion that neither of them may prevail, they form by their coalition a new compound, called *neutral*. In all the combinations of this kind, (except ſome of thoſe with vegetable acids), the alkali and acid are ſo ſtrongly retained by one another, that they are not to be diſunited by any degree of fire. How volatile ſoever the acid was by itſelf, if combined with a fixed alkali, it proves almoſt as fixed as the pure alkali: if the alkali is of the volatile kind, the compound proves alſo volatile, ſubliming in its whole ſubſtance, without any ſeparation of its parts. There are, however, means of procuring this diſunion by the intervention of other bodies, as we have already ſeen in the ſeparation of the volatile alkali of ſal ammoniac, and of the acids of nitre and ſea-ſalt: but in all caſes of this kind, only one of the ingredients of the neutral ſalt can poſſibly be obtained by itſelf, the ſeparation of this happening ſolely in virtue of the ſuperadded body uniting with the other.

There is another kind of compound ſalts, formed by the coalition of acids with earthy and metallic bodies. Theſe ſalts differ from the true neutral ones in ſeveral obvious properties; ſome of them change blue vegetable juices to a green like alkalies, and others to a red like acids, while neutral ſalts make no change in the colour: mixed with boiling milk, they coagulate it, while neutral ſalts rather prevent its coagulation: from moſt of them the acid is diſunited by fire, without the intervention of any additional matter, of which we have ſeen an inſtance in the diſtillation of the acid of vitriol: but the moſt diſtinguiſhing and univerſal character of theſe ſalts is, that ſolutions of them, on the addition of any fixed alkali, grow turbid, and depoſit their earth or metal. It were to be wiſhed, that cuſtom had appropriated ſome particular name to the ſalts of this claſs, to prevent their being confounded, which ſeveral of them have often been, with the perfect neutral ſalts.

The following table exhibits, at one view, the ſeveral compound ſalts reſulting from the union of each of the pure acids with each of the common alkalies and ſoluble earths; the acids being placed on the top, the alkalies and earths on the left hand, and the compound ſalts in the reſpective interſections; and is thus to be underſtood. In the upright columns, under each of the acids, are ſeen the ſeveral compound ſalts reſulting from the union of that acid with the reſpective alkalies and earths on the left ſide. In the tranſverſe columns, oppoſite to each particular alkali and earth, are ſeen the compound ſalts reſulting from the union of that alkali or earth with the reſpective acids on the top; and converſely of each of the compound ſalts expreſſed in the table, the component parts are found on the top of the upright column, and on the left ſide of the tranſverſe column, in whoſe interſection that particular ſalt is placed.

	Vitriolic acid.	Nitrous acid.	Marine acid.	Acetous acid.
Common fixed alkali.	Vitriolated tartar.	Common nitre.	Regenerated ſea-ſalt.	Sal diureticus.
Alkali of sea salt.	Glauber's ſalt.	Cubical nitre.	Sea-ſalt.	A ſalt ſimilar to ſal diuret.
Volatile alkali.	Philoſophic ſal ammon.	Volatile nitre.	Sal ammoniac.	Spiritus Mindereri.
Calcareous Earth.	Selenites.	Calcareous nitre.	Calcareous muriatic ſalt.	A ſubaſtringent ſalt.
Magnesia.	Sal catharticus amarus.	Purging ſalts, not diſtinguiſhed by any particular name.		
Soluble earth of clay.	Alum.	Aſtringent ſalts, not diſtinguiſhed by any particular name.		

687. *Cryſtallization of ſalts.*

This is a general operation on neutral and moſt of the other compound ſalts. It depends upon theſe principles: that water, of a certain degree of heat, diſſolves, of any particular ſalt, only a certain determinate quantity: that, on increaſing the heat, it diſſolves more and more (except only in one inſtance, common ſalt) till it comes to boil; at which time, both its heat and diſſolving power are at their height: that, in returning to its firſt temperature, it throws off again all that the additional heat had enabled it to diſſolve: that, independently of any increaſe or diminution of heat, a gradual evaporation of the fluid itſelf will occaſion a proportional ſeparation of the ſalt; and that the particles of the ſalt, in this ſeparation from the water, unleſs too haſtily forced together by ſudden cooling or ſtrong evaporation, or diſturbed by external cauſes, generally concrete into tranſparent and regularly figured maſſes, called *cryſtals*. The ſeveral ſalts aſſume, in cryſtallization, figures peculiar to each: thus the cryſtals of nitre are hexagonal priſms; thoſe of ſea-ſalt, cubes; thoſe of alum, octohedral maſſes; while ſal ammoniac ſhoots into thin fibrous plates like feathers.

The uſe of preparing ſalts in a cryſtalline form, is not merely in regard to their elegance, but as a mark of, and the means of ſecuring, their purity and perfection. From ſubſtances not diſſoluble in water, they are purified by the previous ſolution and filtration; by cryſtallization, one ſalt is purified from an admixture of ſuch other ſaline bodies as diſſolve either more eaſily or more difficultly than itſelf. For if two or more ſalts be diſſolved together in a certain quantity of hot water, the ſalt which requires the greated heat for its ſolution in that quantity of water, will firſt begin to ſeparate in cooling; and if the water is kept evaporating in an uniform heat, the ſalt which requires moſt water in that heat will be the firſt in cryſtallizing. In all caſes of this kind, if the proceſs is duly managed, the firſt ſhootings are generally well figured and pure; the ſucceeding ones, ſooner or later, according to the quantity of the other ſalts in the liquor, retain an admixture of thoſe ſalts, which they betray by their ſmallneſs and by their figure.

In order to the cryſtallization of ſaline ſolutions, it is cuſtomary to boil down the liquor till ſo much of the fluid has exhaled, as that the ſalt begins to concrete from it even while hot, forming a pellicle upon the ſurface expoſed to the air; when this mark appears, the whole is removed into a cold place. This method ſeldom affords perfect cryſtals; for when water is thus ſaturated with the ſalt in a boiling heat, and then ſuddenly cooled, the particles of the ſalt run haſtily and irregularly together, and form only a confuſed ſemitranſparent maſs. It is by ſlow concretion that moſt ſalts aſſume their cryſtalline form in perfection. The evaporation ſhould be gentle, and continued no longer than till ſome drops of the liquor, in a heat below boiling, being let fall upon a cold glaſs plate, diſcover cryſtalline filaments: the liquor is then immediately to be removed from the fire into a leſs warm, but not a cold place; and the veſſel covered with a cloth, to prevent the acceſs of cold air, and the formation of a pellicle, which, falling down thro' the fluid, would diſturb the regularity of the cryſtallization. This is the moſt effectual method for moſt ſalts; though there are ſome whoſe cryſtallization is to be effected, not by an abatement of the heat, but by a continued equable evaporation of the fluid; ſuch in particular is ſea ſalt.

Salts retain in cryſtallization a portion of the aqueous fluid, without betraying any marks of it to the eye: on this their cryſtalline form appears in great meaſure to depend. The quantity of phlegm or water varies in different ſalts: dry cryſtals of nitre were found, on ſeveral careful trials, to contain about one twentieth of their weight; thoſe of alum, one ſixth; ſea-ſalt, one fourth; borax, green vitriol, and the purging-ſalts, no leſs than one half. The ſame ſalt appears always to retain nearly the ſame quantity.

Some ſalts diſſolve in ſpirit of wine: and here alſo, as in water, the ſolution is limited, though the ſalt is not eaſily recovered in a cryſtalline form. Such in particular are combinations of the nitrous acid with volatile alkalies, and with calcareous earths; of the marine acid with all the ſoluble earths; of the acetous with fixed and volatile alkalies. Scarce any of the compound ſalts, whoſe acid is the vitriolic, are affected by vinous ſpirits.

Salts differ greatly in their diſpoſition to aſſume and retain a cryſtalline form. Many, even of the compound kind, imbibe humidity like fixed alkalies, ſo as to cryſtallize with difficulty; and when cryſtallized, or exſiccated by heat, to deliquiate again in the air. Such are the combinations of the nitrous and marine acid with all the ſoluble earths, and of the acetous both with earths and alkalies. The vitriolic acid, on the other hand, forms, with all the ſubſtances it diſſolves, permanent cryſtals; as do likewiſe the other mineral acids with all alkalies.

The cryſtallization of thoſe ſalts, which are not diſſoluble in ſpirit of wine, is generally promoted by a ſmall addition of that ſpirit; which, abſorbing the water, or weakening its diſſolving power on the ſalt, diſpoſes the ſalt to part from it more freely. The operator muſt be careful, however, not to add too much of the ſpirit, eſpecially where the ſalt is compoſed of an earthy or metallic body united with the acid; leſt it abſorb the acid as well as the water, and, inſtead of a gradual and regular cryſtallization, haſtily precipitate the earth or metal in a powdery form.

Mr Rouelle, of the French Academy of Sciences, has examined with great attention the phenomena of the cryſtallization of ſalts, and publiſhed the reſult of his obſervations in different volumes of the Memoirs of that academy. Among other curious particulars, he has given a general diſtribution of ſalts, in regard to their cryſtallization, which will be of practical utility to the artiſt.

He divides evaporation into three degrees: *inſenſible evaporation*, or that effected by the natural warmth of the atmoſphere, from freezing, up to the heat of the ſummer's ſun; *mean evaporation*, commencing with the ſun's heat, and extending to that in which the exhaling ſteam is viſible to the eye, and the liquor too hot to be endured by the hand; and *ſtrong evaporation*, reaching from this period to boiling. He divides ſalts into ſix claſſes; the diſtinctions of which are taken from the degree of evaporation in which they cryſtallize moſt perfectly, from the figure of their cryſtals, their diſpoſition to remain ſingle or unite into cluſters, and their receiving an increaſe from a continuance of the cryſtallization.

I. The firſt claſs conſiſts of ſalts which cryſtallize into ſmall plates or very thin ſcales. The cryſtals are ſingle. They are, of all ſalts, thoſe which cryſtallize moſt frequently on the ſurface of their ſolutions, which retain leaſt water in their cryſtals, and require moſt to diſſolve in. They cryſtallize moſt perfectly by inſenſible evaporation.	*Sedative ſalts. Selenites.*
II. Salts whoſe cryſtals are cubes, cubes with the angles truncated, or pyramids of four or ſix ſides. They form ſingle, and change their figure by new accretions. By inſenſible evaporation they cryſtallize at the bottom, by mean evaporation at the ſurface, and by both kinds they prove perfect and regular: by ſtrong evaporation the liquor contracts a pellicle, and in cooling yields few cryſtals, and thoſe ill figured.	*Sea ſalt. Vitriolated tartar. Spiritus ſalis marini coagulatis. Tartar.*
III. Salts whoſe cryſtals are tetrahedral, pyramidal, parallelopipeds, rhomboidal, and rhomboidal parallelopipeds; with the angles variouſly truncated according to different circumſtances. They form ſingle (except that ſome few unite by the baſes), and change their figure by new accretions. They cryſtallize at the bottom, moſt perfectly by inſenſible evaporation: by mean and ſtrong evaporation the liquor contracts a pellicle, and in cooling the cryſtals adhere to the pellicle, and prove confuſed and ill formed. They retain a large quantity of water.	*Alum. Borax. Cubical nitre. Seignett's Salt. Green vitriol. Blue vitriol. White vitriol. Verdegris.*

IV. Salts whoſe cryſtals are flattened parallelopipeds, with the extremities terminating in two ſurfaces inclined to one another, ſo as to form a point and acute angles with the large ſides. They cluſter together, uniting by the baſes into tufts. The cryſtals are largeſt and moſt regular by inſenſible evaporation: by mean and haſty evaporation, a pellicle is formed, and in cooling the cryſtals prove very ſmall. They retain a large quantity of water in cryſtallization, and require little to diſſolve in.

Saluble tartar. Tartar united with volatile alkali. Tartar united with abſorbent earth.

V. Salts whoſe cryſtals are very long, in form of needles, priſms, or columns of different ſurfaces. They ſhoot at the bottom, and cluſter together into tufts of regular figures. By inſenſible evaporation they ſcarce ever cryſtallize well. By mean and ſtrong evaporation they give a pellicle; and in ſlow cooling, if the evaporation was not carried too far, they yield perfectly well formed cryſtals, which at firſt ſwim, but ſoon fall to the bottom. If the evaporation was too long continued, the cryſtals prove confuſed and ill formed.

Sal amm. Phil. ſal amm. Nitre. Vol. nitre. Glaub. ſalt. Salt of amb. Vin. united with chalk. Vol. vit. united with fixt alk.

VI. Salts whoſe cryſtals are in very ſmall needles, or of other indeterminate figures. None of them cryſtallize by inſenſible evaporation, and few of them by the mean degree. They require to be reduced by ſtrong evaporation to a thick conſiſtence: they then contract a pellicle, and cryſtallize with confuſion. If the cryſtals are wanted regular, ſpirit of wine muſt be uſed, or ſome other medium if the ſalt is ſoluble in ſpirit. They readily diſſolve in water, and liquefy in the air.

Sal diuret. Marine acid united with abſorbent earths. Nitrous acid united with abſorbent earths.

688. *Purified nitre.* L.

Boil nitre in water till it is diſſolved; filter the ſolution through paper; and then, after due evaporation, ſet it by in a cold place, that the nitre may ſhoot into cryſtals.

Common nitre contains uſually a conſiderable proportion of ſea-ſalt; which in this proceſs is ſeparated, the ſea-ſalt remaining diſſolved after greateſt part of the nitre has cryſtallized. The cryſtals which ſhoot after the firſt evaporation, are large, regular, and pure: but when the remaining liquor is further evaporated, and this repeated a ſecond or third time, the cryſtals prove at length ſmall, imperfect, and tipped with little cubical glebes of ſea-ſalt.

When rough nitre, in the ſtate wherein it is firſt extracted from the earths impregnated with it, is treated in this manner, there remains at laſt a liquor, called *mother-ley*, which will no longer afford any cryſtals. This appears to participitate of the nitrous and marine acids, and to contain an earthy matter diſſolved by thoſe acids. On adding alkaline lixivia, the earth is precipitated; and, when thoroughly waſhed with water, proves inſipid. If the liquor may be evaporated to dryneſs, a bitteriſh ſaline matter is left; which being ſtrongly calcined in a crucible, parts with the acids, and becomes, as in the other caſe, inſipid.

This earth has been celebrated as an excellent purgative, in the doſe of a dram or two; and, in ſmaller doſes, as an alterant in hypochondriacal and other diſorders. This medicine was for ſome time kept a great ſecret, under the names of *magneſia alba, nitrous panacea, count Palmer's powder, il polvere albo Romano, podre de Sentinelli*, &c. till Lanciſi made it public in his notes on the *Metallotheca Vaticana*. It has been ſuppoſed that this earth is no other than a portion of the lime commonly added in the elixation of nitre at the European nitre-works: but though the ſpecimens of magneſia examined by Neumann, and ſome of that which has lately been brought hither from abroad, gave plain marks of a calcareous nature; yet the true magneſia muſt be an earth of a different kind, calcareous earths being rather aſtringent than purgative. The earthy baſis of the *ſal catharticus amarus*, is found to have the properties aſcribed to the true magneſia of nitre, and appears to be the very ſame ſpecies of earth: from that ſalt therefore this medicine is now prepared, as will be ſeen hereafter.

689. *Purified ſal ammoniac.* L.

This ſalt is purified by ſolution in water, filtration, and cryſtallization, after the manner above directed for nitre.

The impurities of ſal ammoniac are commonly ſuch as will not diſſolve in water; and hence the purification is effected by the ſolution and filtration. The very laſt cryſtals ſeldom betray an admixture of any other ſalt.

690. *Purified white vitriol, commonly called* gilla *of vitriol.* E.

Take eight ounces of white vitriol, half an ounce of filings of zinc; water, one pound. Digeſt with a gentle heat for ſome hours; then filter the liquor, and ſet it to cryſtallize.

691. *Salt of vitriol.* L.

Take of white vitriol, one pound; ſtrong ſpirit (called *oil*) of vitriol, one ounce by weight; water, as much as is ſufficient. Boil them together till the vitriol is diſſolved; then filter the liquor; and after due evaporation, ſet it by in a cold place to cryſtallize.

Here the intention is not to ſeparate the ochery matter of the vitriol, but to prevent its ſeparating and colouring the cryſtals. This is effectually anſwered by the addition of the acid, by which it is kept diſſolved.

692. *Burnt alum.* L. E.

Let alum be calcined in an iron or earthen veſſel, ſo long as it bubbles and ſwells up.

The bubbling or bliſtering proceeds from the phlegm retained in the cryſtals: after that is expelled, the ſalt cannot be made liquid by any degree of fire. Alum is compoſed of vitriolic acid and an earth; and it is remarkable, that combinations of that acid with all earths, with moſt metals, and even with vegetable fixed alkalies, are unfuſible.

The alum, thus deprived of its phlegm, proves conſiderably ſtronger, and more acrid, inſomuch as to be ſometimes employed for conſuming fungous fleſh: it is ſaid to have an inconvenience of leaving a hardneſs upon the part.

693. *Calcined vitriol.*

Let green vitriol be calcined in an earthen veſſel, with an open fire, till it becomes thoroughly dry; then breaking the veſſel, take out the vitriol, and ſet it by for uſe, well cloſed from the air. The vitriol is ſufficiently calcined, if it has acquired a red colour at the ſides and bottom of the veſſel. *L.*

This proceſs ſucceeds tolerably well for ſmall quantities, but does not anſwer ſo perfectly for larger. As the action of the fire is exerted firſt on the external parts of the maſs, theſe will be calcined firſt, and, where the quantity is large, exhibit the mark of ſufficient calcination, whilſt the internal part remains almoſt unchanged: and even if the proceſs is ſtill farther continued, the effect required will not be produced; for the outſide growing firſt hard, prevents the evaporation of the aqueous parts from within.

Expoſe any quantity of powdered green vitriol, in an unglazed earthen veſſel, to the action of a moderate fire, till it becomes white. *E.*

This method is ſufficiently troubleſome: for unleſs the heat be very gentle, and the matter ſpread very thin over the bottom of a broad ſhallow veſſel, it is almoſt impoſſible to avoid melting it, which makes it adhere to the ſides of the pan, and renders the previous pulveriſation an uſeleſs labour.

The method uſually practiſed by the chemiſts is, to place a deep earthen pan, with ſome vitriol in it, upon a gentle fire; the vitriol ſoon liquefies, boils up, and by degrees incruſtates to the ſides of the veſſel: ſome more vitriol is then thrown in and ſuffered to incruſtate in the ſame manner; and this procedure repeated till the pan is nearly full of the concreted matter, which proves of a whitiſh colour, except on the outſide next the pan (which muſt be broken to take it out), where it appears yellowiſh or reddiſh, according to the continuance and degree of fire. If the vitriol be deſired ſtill farther dephlegmated, this may be commodiouſly effected, by reducing the maſs into a groſs powder (which will now no longer melt); and then calcining it over a ſtrong fire, in a ſhallow iron pan, till it has gained the degree of dryneſs required, which may be known from its colour.

694. *Vitriolated tartar.*

Diſſolve eight ounces of green vitriol in four pints of boiling water: and whilſt the liquor continues boiling, throw into it ſalt of tartar, or any other alkaline ſalt, till no farther efferveſcence ariſes upon a freſh addition; which generally happens when four ounces, or a little more, of the ſalt have been uſed. Filter the liquor thro' paper, and after due evaporation ſet it by to cryſtallize. *E.*

Here the acid of the vitriol forſakes the iron which it was before in poſſeſſion of, to unite with the alkaline ſalt: particular care ought to be had that the quantity of alkali be ſufficient to fully ſaturate the acid, otherwiſe it will not depoſite all the metal. It is convenient, even after the ſaturation ſeems, from the efferveſcence ceaſing, to be completed, to throw in a little more of the alkali: for by this means the preparation is ſecured from containing any metallic matter; whilſt the ſuperfluous quantity of alkali can do no prejudice, as it remains uncryſtallized.

It is remarkable, that although the vitriolic acid and fixed alkaline ſalt do each readily unite with water, and ſtrongly attract moiſture even from the air; yet the neutral ſalt reſulting from the combination of theſe two, vitriolated tartar, is one of the ſalts moſt difficult of ſolution, very little of it being taken up by cold water. Hence ſome have directed the liquor in this proceſs to be filtered whilſt very hot, ſuſpecting, that if it was ſuffered to cool, great part of the ſalt would be thrown off and left upon the paper. The college, however, have avoided this inconvenience, by ordering a quantity of water which is found to be ſufficient for keeping the ſalt diſſolved in the cold or at leaſt in a moderate warmth.

Take oil of vitriol diluted with equal its quantity of warm water; put it into a large glaſs veſſel, and gradually drop into it a ſolution of purified potaſh in twice its quantity of water, till the efferveſcence ceaſes. Then filter the liquor, evaporate it till a pellicle appears upon the ſurface, and ſet it by in a cold place to cryſtallize. *E.*

This an elegant, and one of the leaſt troubleſome ways of preparing this ſalt. The Edinburgh college, in former editions, ordered the acid liquor to be dropped into the alkaline: by the converſe procedure, now received, it is obviouſly more eaſy to ſecure againſt a redundance of acidity: for the greater certainty in this point, it may be expedient, as in the foregoing proceſs, to drop in a little more of the alkaline ley than the ceſſation of the efferveſcence ſeems to require.

But though the manner of preparation, here directed, appears to be the moſt commodious, there is one imperfection in the proceſs, a deficiency in the quantity of water. There is not near water enough to keep vitriolated tartar diſſolved; and of conſequence, as faſt as the alkaline ſalt is neutralized by the acid, great part falls to the bottom in a powdery form. In the Leyden pharmacopœia, this inconvenience is judiciouſly provided againſt: The oil of vitriol is diluted with four times its quantity of water; and the alkaline ley being gradually dropped into it till the point of ſaturation is obtained, four times the quantity of water is added, and the mixture boiled, that ſuch part of the ſalt as had precipitated may be diſſolved: the liquor is then filtered while hot, and ſet by to cryſtallize. In order to obtain perfect and well-formed cryſtals, the liquor ſhould not be ſet in the cold, but continued in a moderate heat, ſuch as the hand can ſcarcely bear, that the water may ſlowly evaporate.

Vitriolated tartar, in ſmall doſes, as a ſcruple or half a dram, is an uſeful aperient; in larger ones, as four or five drams, a mild cathartic, which does not paſs off ſo haſtily as the *ſal catharticus amarus*, or *Glauber's ſalt*, and ſeems to extend its action further. The wholeſale dealers in medicines have commonly ſubſtituted to it an article otherwiſe almoſt uſeleſs in their ſhops, the reſiduum of Glauber's ſpirit of nitre. The purchaſer ought, therefore, to inſiſt upon the ſalt being in a cryſtalline form. The cryſtals, when perfect, are oblong, with ſix flat ſides, and terminated at each end by a ſix-ſided pyramid: ſome appear compoſed of two pyramids joined together by the baſes, and many are irregular.

695. *Vitriolated nitre.* L.

Diſſolve in warm water the maſs which remains after the diſtillation of Glauber's ſpirit of nitre: filter the ſolution through paper, and cryſtallize the ſalt.

This ſalt is not different from the *vitriolated tartar*, being compoſed of the vitriolic acid, and the alkaline baſis of nitre; which alkali is no other than the common vegetable fixed alkaline ſalt, as ſalt of tartar or potaſh: it is, in effect, from the aſhes of vegetables, that the nitre prepared in Europe receives its alkaline baſis. If any unchanged nitre remains in the maſs, it is left diſſolved in the water while the vitriolated alkali cryſtallizes.

696. *Sal polychreſtum, or ſalt of many virtues.*

Take of nitre in powder, flowers of ſulphur, of each equal parts. Mingle them well together, and inject the mixture, by little and little at a time, into a red-hot crucible: after the deflagration ceaſes, keep the crucible in the fire for an hour. The ſalt may be purified by diſſolving it in warm water, filtering the ſolution, and exhaling it to dryneſs; or by cryſtallization.

This is another method of uniting the vitriolic acid with the common vegetable fixed alkali. Both the nitre and the ſulphur are decompounded in the operation: the acid of the nitre, and the inflammable principle of the ſulphur, detonate together, and are diſſipated; while the acid of the ſulphur remains combined with the alkaline baſis of the nitre. The ſhops accordingly have ſubſtituted to the ſal polychreſt the foregoing preparation.

697. *Sal prunellæ.* E.

Take of pure nitre, reduced to powder, two pounds; flowers of ſulphur, one ounce. Melt the nitre in a crucible, and ſprinkle into it the ſulphur by little at a time. When the deflagration is over, pour out the melted ſalt upon a clean, dry, and warm braſs plate, ſo as to form it into cakes.

Thoſe who prepare ſal prunell in large quantities, make uſe of a clean iron pot inſtead of a crucible; and, when the nitre is melted, and the ſulphur deflagrated, take out the ſalt with an iron ladle, and pour it into braſs moulds kept for this purpoſe. The previous pounding of the nitre, directed above, may be as well omitted, as occaſioning a needleſs trouble.

This preparation was formerly in great eſteem, and is ſometimes ſtill ordered in preſcription.

698. *The cathartic ſalt of Glauber, commonly called* ſal mirabile. L. E.

Diſſolve in warm water the maſs which remains after the diſtillation of ſpirit of ſea-ſalt: filter the ſolution, and cryſtallize the ſalt.

The title of this ſalt expreſſes its medical virtues. Taken from half an ounce to an ounce or more, it proves a mild and uſeful purgative; and in ſmaller doſes, largely diluted, a ſerviceable aperient and diuretic. The ſhops frequently ſubſtitute to it the ſal catharticus amarus, which is nearly of the ſame quality, but ſomewhat more unpleaſant, and, as is ſaid, leſs mild in operation. They are very eaſily diſtinguiſhable from one another, by the effect of alkaline ſalts upon ſolutions of them. The ſolution of Glauber's ſalt ſuffers no viſible change from this addition, its own baſis being a true fixed alkali: but the ſolution of the ſal catharticus amarus grows inſtantly white and turbid; its baſis, which is an earth, being extricated copiouſly by the alkaline ſalt: as in the following proceſs.

699, a. *Magneſia alba*, or *White magneſia.* E.

Diſſolve ſal catharticus amarus in a ſufficient quantity of water. Filter the ſolution; and add to it a filtered ley of potaſh, ſo long as a freſh addition continues to occaſion any milkineſs. A white powder will precipitate; which, being ſeparated from the liquor is to be boiled for ſome time in water, and afterwads dried.

This powder appears to be the ſame ſpecies of earth with that obtained from the mother ley of nitre (ſee n° 688.) which was for ſeveral years a celebrated ſecret in the hands of ſome particular perſons abroad. Hoffman, who deſcribes the preparation of the nitrous magneſia, gives it the character of an uſeful antacid, a ſafe and inoffenſive laxative in doſes of a dram or two, and diaphoretic and diuretic when given in ſmaller doſes of fifteen or twenty grains. Since this time it has had a conſiderable place in the practice of foreign phyſicians, and now begins to come into eſteem among us, particularly in heartburns, and for preventing or removing the many diſorders which children are ſo frequently thrown into from a redundance of acid humours in the firſt paſſages: it is preferred, on account of its laxative quality, to the common abſorbents, which (unleſs gentle purgatives are given occaſionally to carry them off) are apt to lodge in the body, and occaſion a coſtiveneſs very detrimental to infants.

Though the preparation of this medicine is now commonly known, its nature and properties are very little underſtood: whilſt ſome ſuppoſe it to poſſeſs uncommon virtues, others affirm, that, when duly edulcorated, it is in no reſpect different from calcined hartſhorn, or any other ſimple animal or vegetable earth. The following obſervations of its real properties will be ſufficient to determine this point.

Magneſia alba, when prepared in perfection, is a white and very ſubtile earth, perfectly void of ſmell or taſte, of the claſs of thoſe which diſſolve in acids. It diſſolves freely, even in the vitriolic acid; which, in the common way of making ſolutions, takes up only an inconſiderable portion of other earths. Combined with this acid, it forms a bitter ſalt, very eaſily ſoluble in water; while the common abſorbents form with the ſame acid almoſt inſipid concretes, very difficult of ſolution. Solutions of magneſia in all acids are bitter and purgative; while thoſe of the other earths are more or leſs auſtere and aſtringent. A large doſe of the magneſia, if the ſtomach contains no acid to diſſolve it, does not purge or produce any ſenſible effect: a moderate one, if an acid is lodged there, or if acid liquors are taken after it, procures ſeveral ſtools; whereas the common abſorbents, in the ſame circumſtances, inſtead of looſening, bind the belly. It is obvious, therefore, that magneſia is ſpecifically different from the other earths, and that it is applicable to uſeful purpoſes in medicine.

699, b. *Burnt magneſia.* E.

Let any quantity of magneſia be put into a crucible, and heated hot, in which ſtate keep it for two hours; then take it out, and preſerve it in a glaſs bottle well ſtopped.

700. *Cubical nitre.*

Diſſolve chalk or lime in purified aquafortis; and add the ſolution by degrees to a ſolution of Glauber's ſalt in water, ſo long as a freſh addition produces any milkineſs: a white powder will precipitate; after which the liquor is to be filtered, and, after due evaporation, ſet to cryſtallize.

In this proceſs, both the ſolutions are decompounded, and two new compounds produced. The vitriolic acid of the Glauber's ſalt unites with the chalk; and forms with it an indiſſoluble ſelenitic concrete, which of courſe precipitates; while the alkali of the Glauber's ſalt, and the nitrous acid, unite into a neutral ſalt, which is ſeparated from the liquor by cryſtallization; the cryſtals are rhomboidal, of a cooling taſte, greatly reſembling that of common nitre. How far this ſalt differs from common nitre in its medical virtue, is not known. The proceſs is here inſerted, partly as being a very inſtructive one in regard to the tranſpoſitions which happen on the mixture of different ſaline bodies, and partly as affording the moſt convenient means of obtaining the pure alkaline baſis of ſea-ſalt. In the diſtillation of ſpirit of ſalt, that baſis was diſunited from its own acid, and combined with the vitriolic: it is here transferred from the vitriolic to the nitrous; and in n° 644, we have given a method of diſſipating or deſtroying the nitrous acid, and leaving the alkali, that was combined with it, pure.

701. *Spirit of ſea-ſalt coagulated.* L.

Drop, into Glauber's ſpirit of ſea-ſalt, a ley of fixed alkaline ſalt, till all efferveſcence ceaſes; then evaporate the mixture to dryneſs.

This preparation is inſerted, under the ſame title, in the Wirtemburg pharmacopœia. It has been commonly called *regenerated ſea-ſalt*, though with little propriety, as it differs from that ſalt in its baſis; the common vegetable alkali being here ſubſtituted to the mineral alkali of ſea-ſalt. How far it differs from ſea-ſalt in its medicinal qualities, hath not yet been determined: it is manifeſtly ſharper in taſte, and ſomewhat more difficult both of ſolution in water and of fuſion in the fire.

702. *Regenerated tartar.* E.

Put any quantity of dry ſalt of tartar, powdered, into a large glaſs veſſel; and pour thereon, by little and little, as much diſtilled vinegar as is neceſſary to ſaturate it. Filter the liquor; and exhale it, over a very gentle fire, to dryneſs, taking great care that the matter contract not an empyreuma. On the ſalt which remains, pour as much more ſpirit of vinegar as will ſaturate it; then depurate the liquor again, and carefully exſiccate it into a dry ſalt.

If the common alkalies are made uſe of for this proceſs, they ſhould be previouſly purified, by ſolution and cryſtallization, from the neutral ſalt which they generally contain. The diſtilled vinegar may be perfectly free from any empyreumatic taint: it is not neceſſary to dephlegmate it, or throw away the firſt runnings in the diſtillation, ſince theſe contain a portion of the acid (the part here wanted) as well as the phlegm.

It is difficult to hit the point of ſaturation betwixt the acetous acid and the alkaline ſalt. After about fourteen parts of ſtrong diſtilled vinegar have been gradually poured upon one of the fixed ſalt, the addition of a little more of the acid will not occaſion any further efferveſcence in the cold; but if the mixture be now ſtrongly ſtirred and well heated, the efferveſcence will appear afreſh; upon which ſome more vinegar is to be added, till it again ceaſes. The ſaturation is not as yet complete; for upon exhaling the aqueous parts, the remaining ſalt ſtill efferveſces with freſh vinegar. When ſo much of the acid has now been added, that no marks of fermentation any longer appear, a little more of the vinegar may be poured in before you proceed to the laſt evaporation; by this means, the ſaturation of the alkali will be ſecured, whilſt, if the acid prevails, the ſuperfluous quantity of it will exhale.

The ſalt thus prepared, is of a dark-brown colour, a peculiar, not ungrateful odour, a penetrating, ſaponaceous, ſaline taſte, in nowiſe alkaline or acid. Its brown colour and ſaponaceous quality proceed from the oily parts of the vinegar; the depuration of the ſalt from this oil, is not in the foregoing proceſs inſiſted on. In the London pharmacopœia, the ſalt is ordered to be purified to perfect whiteneſs, under the title of

703. *Diuretic ſalt.* L.

Take a pound of any fixed alkaline ſalt; and boil it, with a very gentle heat, in four or five times its weight of diſtilled vinegar. When the fermentation ceaſes, add more diſtilled vinegar; and proceed with freſh additions thereof, until, the vinegar being almoſt evaporated, freſh vinegar will no longer raiſe any fermentation; which generally happens by the time that twenty pounds of diſtilled vinegar have been uſed. Then ſlowly exhale to dryneſs.—Melt the remaining impure ſalt for a little time, but not too long, over a gentle fire; then diſſolve it in water, and filter the ſolution through paper. If the melting has been duly performed, the filtered liquor will be limpid and colourleſs as water; but if otherwiſe, of a brown colour.—Evaporate the limpid ſolution, with an exceeding gentle heat, in a ſhallow glaſs veſſel; occaſionally ſtirring the ſalt as it dries, that its moiſture may be the ſooner exhaled. Afterwards keep it for uſe in a veſſel very cloſely ſtoped; for it will liquefy by the air.

This ſalt ought to be of perfect whiteneſs; and ſhould totally diſſolve both in water and in ſpirit of wine, without leaving any fæces. If the ſalt, though ever ſo white, depoſites any fæces in ſpirit of wine; the whole of it muſt be diſſolved in that ſpirit, the ſolution filtered, and exſiccated again.

The purification of this ſalt is not a little troubleſome. The operator muſt be particularly careful in melting it, not to uſe too great a heat, or to keep it liquefied too long: a little ſhould be occaſionally taken out, and put into water; and as ſoon as it begins to part freely with its black colour, the whole is to be removed from the fire. In the laſt drying, the heat muſt not be ſo great as to melt it; otherwiſe it will not prove totally ſoluble. If the ſolution in ſpirit of wine be exſiccated, and the remaining ſalt liquefied with a very ſoft fire, it gains the leafy appearance which has procured it the name of *terra foliata*.

Theſe ſalts are medicines of great efficacy, and may be ſo doſed and managed as to prove either mildly cathartic, or powerfully diuretic: few of the ſaline deobſtruents come up to them in virtue. The doſe is from half a ſcruple to a dram or two. A bare mixture of alkaline ſalt and vinegar without exſiccation, is not perhaps much inferior as a medicine to the more elaborate ſalt.

704. *Spirt of Mindererus.* E.

Take any quantity of the volatile alkaline ſalt of ſal ammoniac, and gradually power upon it diſtilled vinegar, till the effervеſcence ceaſes; occaſionally ſtirring the mixture, to promote the action of the vinegar on the ſalt.

This is an excellent aperient ſaline liquor. Taken warm in bed, it proves commonly a powerful diaphoretic or ſudorific; and as it operates without heat, it has place in febrile and inflammatory diſorders, where medicines of the warm kind, if they fail of procuring ſweat, aggravate the diſtemper. Its action may likewiſe be determined to the kidneys, by walking about in a cool air. The common doſe is half an ounce, either by itſelf, or along with other medicines adapted to the intention. Its ſtrength is not a little precarious, depending in great meaſure on that of the vinegar; an inconvenience which cannot eaſily be obviated, for the ſaline matter is not reducible to the form of a concrete ſalt.

§ 7. ANOMALOUS SALTS.

705. *Cryſtals of tartar.*

Let powdered white tartar be boiled in twenty times its quantity of water, till perfectly diſſolved; and the ſolution, whilſt it contiuues hot, paſſed through filtering paper, or a woollen cloth, and received in a wooden veſſel: then expoſe it for a night or longer to the cold air, that cryſtals may form themſelves, and ſhoot to the ſides of the veſſel: the water being now poured off, the cryſtals are to be collected and dried for uſe.

The filtration of the ſolution of tartar through paper ſucceeds very ſlowly; and unleſs managed with a good deal of addreſs, not at all: for as ſoon as the boiling liquor begins to grow ſenſibly leſs hot, it depoſites much of the tartar all over the ſurface of the paper, which hinders the remainder from paſſing through. Zwelffer, in his animadverſions on this proceſs in the Auguſtan pharmacopœia, directs the ſolution to be clarified with whites of eggs, and ſtrained only through a linen cloth. He likewiſe judiciouſly orders the veſſel to be cloſe covered, and the cryſtallization performed in a warm place: for if the ſolution be ſuffered to cool very faſt, it is in vain to expect any appearance of cryſtals; the tartar will inevitably be precipitated to the bottom of the veſſel in the form of ſand. And indeed, the buſineſs of refining and cryſtallizing tartar is ſo very troubleſome, and requires ſo large an apparatus, that ſcarce any of the apothecaries, or even of the trading chemiſts, are at the trouble of it; but either import it ready refined from Holland, or purchaſe it from ſome people here who make it their ſole buſineſs.

706. *Cream of tartar.*

Take any quantity of ſolution of tartar, made as in the foregoing proceſs, and paſſed through a filter. Boil it over the fire, till a thick cuticle appears on the ſurface, which is to be taken off with a wooden ſkimmer bored full of holes: continue the boiling till a freſh cuticle ariſes, which is to be taken off as the foregoing, and the operation repeated till the whole quantity of liquor is thus conſumed. Afterwards dry all the cuticles together in the ſun.

The preparation of this in no reſpect differs from cryſtals of tartar reduced to powder. Indeed the purchaſer ought always to prefer the cryſtals; for the powder is often ſophiſticated with ſaline ſubſtances of another kind.

707. *Soluble tartar.* L. E.

Diſſolve a pound of any fixed alkaline ſalt in a gallon of boiling water; and gradually throw in cryſtals of tartar, as long as a freſh addition thereof raiſes any effervеſcence; which generally ceaſes before three pounds of the cryſtals have been uſed. Then filter the liquor; and, after due evaporation, ſet it by to cryſtalize, or evaporate it to dryneſs, and keep the remaining ſaline maſs for uſe.

Common white tartar is perhaps preferable for this operation to the cryſtals uſually met with. Its impurities can here be no objection; ſince it will be ſufficiently depurated by the ſubſequent filtration.

Soluble tartar, in doſes of a ſcruple, half a dram, or a dram, is a mild cooling aperient; two or three drams commonly looſen the belly; and an ounce proves pretty ſtrongly purgative. Malouin ſays it is equal in purgative virtue to the cathartic ſalt of Glauber. It is an uſeful addition to the purgatives of the reſinous kind, as it promotes their operation, and at the ſame time tends to correct their griping quality. But it muſt never be given in conjunction with any acid: for all acids decompound it; abſorbing its alkaline ſalt, and precipitating the tartar.

708. *Rochelle ſalt.* Ph. Par.

Let the ſalt extracted from the aſhes of the kelp or kali of Alicant be calcined till it melts; then diſſolve in water, the ſolution filtered, and after due evaporation ſet by, that the ſalt may ſhoot into pure white cryſtals. Diſſolve cryſtals of tartar in boiling water, and ſaturate the ſolution with the cryſtals of kali: the proportions neceſſary for this purpoſe will be, about ſixteen ounces of the latter to twenty of the former. Duly exhale the liquor in the heat of a water-bath; and after filtration, ſet it in the cold to cryſtalize.

This is a ſpecies of ſoluble tartar, made with the ſalt of kali or ſoda, with the mineral alkali or baſis of of ſea-ſalt: It cryſtallizes far more eaſily than the preceding preparation, and does not, like it, grow moiſt in the air. It is alſo conſiderably leſs purgative, but is equally decompounded by acids. It appears to be a very elegant ſalt, and begins now to come into eſteem in this country, as it has long been in France.

709. *Eſſential ſalt of ſorrel.*

Let the juice of ſorrel, after ſettling and decantation from the fæces, be evaporated, till only one-third remains; then ſtrained through a flannel-bag, and exhaled again till a pellicle appears upon the ſurface. Put the liquor into a glaſs veſſel; and, a little oil olive being poured upon the top, ſet it by in a cellar till plenty of cryſtals are formed: theſe are to be gently waſhed with water, and afterwards dried.

After the ſame manner, eſſential ſalts are obtained from all acid, auſtere, aſtringent, and bitteriſh plants that contain but a ſmall quantity of oil.

Herbs of a dry nature are to be moiſtened, in the bruiſing, with a little water, that the juice may be the more eaſily preſſed out

The waters of theſe plants, which are in vain endeavoured to be drawn over by diſtillation, may be obtained by diſſolving a ſuitable quantity of their eſſential ſalts in common water.

713. The proceſs for obtaining theſe ſalts is very tedious, inſomuch as ſcarce to be completed in leſs than ſeven or eight months; and the quantity of ſalt which the juices afford, is extremely ſmall: hence they are hardly ever made or expected in the ſhops.

714. The virtues of the eſſential ſalts have not been ſufficiently determined from experience.

710. *Flowers of benzoine.*

Put ſome powdered benzoine into an earthen pot placed in ſand; and with a gentle heat ſublime the flowers into a conical paper-cap fitted to the pot. —Or the ſublimation may be performed in a retort; the flowers will ariſe with a ſoft heat into the neck. —If the flowers have any yellow tinge, mix them with tobacco-pipe clay, and ſublime again. *L.*

The ſublimation is to be performed in a glazed earthen pot, and repeated in the ſame inſtruments with freſh parcels of benzoine, till the paper-cap becomes foul with oil. *E.*

Benzoine, expoſed in a retort to a gentle fire, melts and ſends up into the neck white ſhining cryſtalline flowers, which are followed by an oily ſubſtance. On raiſing the heat a little, (a recipient being applied to the neck of the retort), a thin yellowiſh oil comes over, intermingled with an acid liquor, and afterwards a thick butyraceous ſubſtance: this laſt, liquefied in boiling-water, gives out to it a conſiderable quantity of ſaline matter, (ſeparable by filtration and proper exhalation), which appears in all reſpects ſimilar to the flowers.

It appears, therefore, that the whole quantity of flowers which benzoine is capable of yielding, cannot be obtained by the above proceſſes, ſince a conſiderable portion ariſes after the time of their being diſcontinued: the greateſt part of the flowers ariſes with a leſs degree of heat than what is neceſſary to elevate the oil; but that if the operation is haſtily conducted, or if the fire is not exceeding gentle, the oil will ariſe along with the flowers, and render them foul. Hence in the way of trade, it is extremely difficult to prepare them of the requiſite whiteneſs and purity: the heat which becomes neceſſary when large quantities of the benzoine are employed, being ſo great as to force over ſome of the oil along with them.

In order therefore to obtain theſe flowers in perfection, only a ſmall quantity of benzoine ſhould be put into the veſſel at a time: and that this may not be any impediment to the requiſite diſpatch, a number of ſhallow, flat-bottomed, earthen diſhes may be employed, each fitted with another veſſel inverted over it. With theſe you may fill a ſand-furnace, having freſh diſhes charged in readineſs to replace thoſe in the furnace as ſoon as the proceſs ſhall appear finiſhed in them: the reſiduum of the benzoine ſhould be ſcraped out of each of theſe veſſels before a freſh parcel is put in.

Theſe flowers, when made in perfection, have an agreeable taſte and fragrant ſmell. They totally diſſolve in ſpirit of wine, and likewiſe by the aſſiſtance of the heat in water; but ſeparate again from the latter upon the liquor's growing cold, ſhooting into ſaline ſpicula, which unite together into irregular maſſes. By the mediation of ſugar, they remain ſuſpended in cold water, and thus form an elegant balſamic ſyrup. Some have held them in great eſteem, as pectoral and ſudorific, in the doſe of half a ſcruple or more: but the preſent practice rarely makes uſe of them, on account of the offenſive oil which, as uſually prepared, they are tainted with, and from which a freſh ſublimation from tobacco-pipe clay does not free them ſo effectually as might be wiſhed. The obſervations above related point out a method of depurating them more perfectly, viz. by ſolution, filtration, and cryſtallization.

711. *Salt of borax, called* ſedative ſalt.

Put eight ounces of powdered borax into a wide-necked retort; pour thereon three ounces of water, and then add three ounces of oil of vitriol. Place the retort in a proper furnace, adapt to it a receiver, and increaſe the fire till the veſſel becomes red-hot. The ſedative ſalt will ariſe into the neck in form of thin ſhining plates, which are to be ſwept out with a feather; and a little liquor will paſs into the receiver. When the matter in the retort is grown cool, pour back upon it the diſtilled liquor, and ſublime again. Repeat this proceſs ſo long as the borax continues to yield any conſiderable quantity of ſaline flowers. Or,

Diſſolve the borax in a ſufficient quantity of warm water, and add thereto the oil of vitriol. Evaporate this mixture till thin plates begin to appear upon the ſurface; then ſuffer the fire to decay, and let the veſſel ſtand unmoved till plenty of cryſtals are formed, which are to be well rinſed with cold water, and then dried for uſe.

In the preparation of this ſalt by ſublimation, the fire muſt be expeditiouſly raiſed when the matter begins to grow dry; for it is only at this period that the ſalt ſublimes. The ſublimed ſalt itſelf, in a perfectly dry ſtate, proves fixed in the fire; if moiſtened with water, and then expoſed to a ſmart heat, part of it continues to riſe till the moiſture is wholly exhaled; after which, nothing more can be forced up by heat till the ſalt is again moiſtened. Hence the uſe of returning the diſtilled liquor, and repeating the ſublimations. Lemery ſays, he found flowers continue to riſe till the thirty-ſixth ſublimation; and that the quantity obtained by all theſe ſublimations amounted to half an ounce and thirty-five grains from two ounces of borax.

The proceſs of cryſtallization is leſs troubleſome than that by ſublimation; but the ſalt proves generally leſs white, and is apt likewiſe to retain a part of the Glauber's ſalt, eſpecially if the evaporation is too long protracted.

The ſedative ſalt appears to the taſte a neutral ſalt; but, examined with alkalies, has the properties of an acid, effervescing, uniting, and cryſtallizing with them, and deſtroying their alkaline quality. It diſſolves both in water and in ſpirit of wine, though not very readily in either. As to its virtue, it is ſuppoſed to be a mild anodyne (whence its name) to calm the heat of the blood in burning fevers, to prevent or remove delirious ſymptoms, and allay ſpaſmodic affections, whether hypochondriacal or hyſterical, at leaſt for a time. The doſe is from two to eighteen grains in any proper liquor.

712. *Spirit, ſalt, and oil, of amber.* E.

Mix powdered white amber with thrice its weight of clean ſand, and put them into a glaſs retort, of which the mixture may fill one half: then adapt a large receiver, and diſtil in a ſand-furnace, with a fire gradually increaſed. At firſt a ſpirit will come over with ſome yellow oil; then more yellow oil along with a little ſalt; and upon raiſing the heat, more of the ſalt, with a reddiſh coloured oil.—— When the diſtillation is finiſhed, empty the liquor out of the receiver; and having collected together the ſalt which adheres to the ſides, dry it by gentle preſſure between the folds of ſome ſpongy paper.— The oil may be ſeparated from the ſpirit by filtration, and afterwards rectified by four diſtillations, uſing very clean retorts, and leaving an eighth part of the oil each time, which is to be thrown away as uſeleſs.—The ſalt is to be purified by ſolution in water and cryſtallization.

In the diſtillation of amber, the fire muſt for ſome time be continued gentle, ſcarce exceeding the degree at which water boils, till the aqueous phlegm and thin oil have ariſen; after which it is to be ſlowly increaſed. If the fire was urged haſtily, the amber would ſwell up, and riſe in its whole ſubſtance into the receiver, without undergoing the required decompoſition or ſeparation of its parts. When ſand or other like intermedia are mixed with it, it is leſs ſubject to this rarefaction, and the fire may be raiſed ſomewhat more expeditiouſly; though this little advantage is perhaps more than counterbalanced by the room which the ſand takes up in the retort.

Our chemiſts generally leave the receiver unluted, that it may be occaſionally removed as the ſalt riſes and concretes in the neck of the retort; from whence it is every now and then ſcraped out, to prevent the oil from carrying it down into the receiver. When a groſs thick oil begins to ariſe, and no more ſalt appears, the diſtillation is ſtopped, though it might perhaps be continued longer to advantage.

713. The *ſpirit of amber*, ſo called, is no more than a ſolution of a ſmall portion of the ſalt in phlegm or water; and therefore is very properly employed for diſſolving the ſalt in order to its cryſtallization.

721. Pure *ſalt* of amber has a penetrating, ſubaſtringent acid taſte. It diſſolves both in water and in rectified ſpirit, though not readily in either, and ſcarcely at all in the latter without the aſſiſtance of heat: of cold water in ſummer, it requires for its ſolution about twenty times its own weight; of boiling water, only about twice its weight. Expoſed in a glaſs veſſel, to a heat a little greater than that of boiling water, it firſt melts, then riſes in a white fume, and concretes again in the upper part of the glaſs into fine white flakes, leaving, unleſs it was perfectly pure, a little coaly matter behind. It effervesces with alkalies both fixed and volatile, and forms with them neutral compounds, greatly reſembling thoſe compoſed of the ſame alkalies and vegetable acids. Mixed with acid liquors, it makes no ſenſible commotion. Ground with fixed alkaline ſalts, it does not exhale any urinous odour. By theſe characters, it is conceived this ſalt may be readily diſtinguiſhed from all the other matters that have been mixed with or vended for it. With regard to its virtue, it is accounted aperient, diuretic, and, on account of its retaining ſome portion of the oil, antihyſteric. Boerhaave gives it the character of *diureticorum et antihyſtericorum princeps*. Its great price, however, has prevented its coming much into uſe; and perhaps its real virtues are not equal to the opinion generally entertained of them.

714. The rectified *oil* has a ſtrong bituminous ſmell, and a pungent acrid taſte. Given in a doſe of ten or twelve drops, it heats, ſtimulates, and promotes the fluid ſecretions: it is chiefly celebrated in hyſterical diſorders, and in deficiencies of the uterine purgations. Sometimes it is uſed externally in liniments for weak or paralytic limbs, and rheumatic pains. This oil differs from all thoſe of the vegetable kingdom, and agrees with the mineral petrolea, in not being ſoluble, either in its rectified or unrectified ſtate, by ſpirit of wine, fixed alkaline lixivia, or volatile alkaline ſpirits; the oil, after long digeſtion or agitation, ſeparating as freely as common oil does from water.

SECT. IX. *Preparations of ſulphur.*

715. *Flowers of Sulphur.* L.

SUBLIME ſulphur in proper veſſels; and reduce the flowers that concrete into powder, either in a wooden mill, or in a marble-mortar with a wooden peſtle.

This proceſs is rarely attempted by the apothecaries, a large apparatus being neceſſary for performing it to advantage. Thoſe who prepare the flowers of brimſtone in quantity, uſe for the ſubliming veſſel a large iron pot, capable of holding two or three hundred weight; this communicates with an arched chamber, lined with glazed tiles, which ſerves for the recipient.

This preparation of ſulphur makes no change in its qualities; only ſeparating its impurities, and at the ſame time reducing it into a finer powder than it can eaſily be brought to by other means. At the bottom of the ſubliming veſſel there remains a ponderous grey-coloured maſs, compoſed of ſand, earth, ſtony and ſometimes metallic matters, with a ſmall portion of ſulphur that has eſcaped the ſubliming heat. This is uſually broken in pieces, and vended in the ſhops under the name of *ſulphur vivum*.

716. *Waſhed flowers of ſulphur.* L.

Pour upon the flowers as much water as will ariſe to the height of four fingers above them, and boil them for ſome time: then pouring off this water, let ſome cold water be added, and thoroughly waſh the flowers; after which they are to be dried for uſe.

As the flowers of ſulphur are generally ſublimed into very capacious rooms, which contain a large quantity of air, or in veſſels not perfectly cloſe; ſome of thoſe that ariſe at firſt are apt to take fire, and thus are changed into a volatile acid vapour, which mingling with the flowers that ſublime afterwards, communicates to them a notable degree of acidity. In ſuch caſe the ablution here directed is for the general uſe of the medicine abſolutely neceſſary; for the flowers, thus tainted with acid, ſometimes occaſion gripes, and may in other reſpects be productive of effects different from thoſe of pure ſulphur.

717. *Thick balſam of ſulphur.* E.

Take eight ounces of olive-oil, and one ounce of flowers of ſulphur. Boil them together over a gentle fire, keeping them continually ſtirring, till they come to the conſiſtence of a balſam.

Linſeed oil more readily diſſolves ſulphur than oil-olive, and a preparation made with it is reckoned ſomewhat leſs diſagreeable. The veſſel they are boiled in ought to be capable of holding at leaſt three times the quantity of the ingredients. As ſoon as the oil begins to act upon the ſulphur, which happens nearly at the point of ebullition, the mixture rarifies very much, ſo as, if not prudently removed from the fire, to run over into the furnace; and as the matter is very ſuſceptible of flame, dangerous conſequences may enſue, eſpecially if the quantity is large. The operator ought therefore to be upon his guard in the management of this proceſs.

718. *Balſam of ſulphur with Barbadoes tar.* L.

This is made after the ſame manner as the foregoing, by uſing Barbadoes tar inſtead of the oil.

719. *Balſam of ſulphur with oil of turpentine.*

Take two ounces of waſhed flowers of ſulphur, and ſix ounces of oil of turpentine. Digeſt them together in a ſand-heat, till the oil is ſaturated with the ſulphur.

720. *Balſam of ſulphur with oil of aniſeed.*

Take two ounces of waſhed flowers of ſulphur; ſix ounces of oil of turpentine; and four ounces of eſſential oil of aniſeeds. Digeſt them together as in the preceding proceſs.

Theſe preparations are more conveniently and ſafely made in a tall glaſs body, with the mouth at leaſt an inch in diameter, than in the circulatory or cloſe veſſels in which they have commonly been directed to be prepared: for when the ſulphur and oil begin to act vehemently upon each other, they not only rarify into a large volume, but likewiſe throw out impetuouſly great quantities of an elaſtic vapour, which, if the veſſels are cloſed, or the orifices not ſufficient to allow it a free exit, infallibly burſt them: Hoffman relates a very remarkable hiſtory of the effects of an accident of this kind. In the veſſel above recommended, the proceſs may be completed, without danger, in four or five hours, by duly managing the fire; which ſhould be very gentle for ſome time, and afterwards increaſed ſo as to make the oil juſt bubble or boil, in which ſtate it ſhould be kept till all the ſulphur appears to be taken up.

Eſſential oils, employed as menſtrua for ſulphur, undergo a great alteration from the degree of heat neceſſary for enabling them to diſſolve the ſulphur; and hence the balſams have not near ſo much of their flavour as might be expected. It ſhould therefore ſeem more eligible to add a proper quantity of the eſſential oil to the ſimple balſam: theſe readily incorporate by a gentle warmth, if the veſſel be now and then ſhaken. Sixteen parts of eſſential oil, and ſix of the *thick balſam*, compoſe a balſam more elegant than thoſe made in the foregoing manner, and which retains ſo much of the flavour of the oil as is in ſome meaſure ſufficient to cover the taſte of the ſulphur and render it ſupportable.

Balſams of ſulphur have been ſtrongly recommended in coughs, conſumptions, and other diſorders of the breaſt and lungs. But the reputation which they have had in theſe caſes does not appear to have been built upon any fair trial or experience of their virtues. They are manifeſtly hot, acrimonious, and irritating; and therefore ſhould be uſed with the utmoſt caution. They have frequently been found to injure the appetite, offend the ſtomach and viſcera, parch the body, and occaſion thirſt and febrile heats. The doſe is from 5 to 20 drops. Externally, they are employed for cleanſing and healing foul running ulcers: Boerhaave conjectures, that their uſe in theſe caſes gave occaſion to the virtues aſcribed to them when taken internally.

721. *Precipitated ſulphur.* L.

Boil flowers of ſulphur in water, with thrice their weight of quicklime, till the ſulphur is diſſolved. Filter the ſolution, and drop into it ſome of the weak ſpirit of vitriol: this will throw down a precipitate, which is to be waſhed in freſh portions of water, till it becomes inſipid.

722. *Lac ſulphuris.*

Boil the hepar ſulphuris, reduced to powder, in four times its quantity of water for three hours; adding more water if there is occaſion. Then filter the ſolution whilſt hot; and drop it into ſpirit of vitriol, till the efferveſcence ceaſes; a powder will be precipitated to the bottom, which is to be waſhed with hot water, and afterwards dried for uſe.

The method of preparing this lac, as it is called, with hepar ſulphuris, is the moſt expeditious, and leaſt troubleſome, provided the hepar † be well made; and, on the other hand, quicklime gives the preparation a more ſaleable whiteneſs. Some have been accuſtomed to add to the quicklime a portion of alkaline ſalt, with a view to promote its diſſolving power.

The medicine is nearly the ſame in both caſes. It would be exactly the ſame, if the precipitation was performed with any other acid than the vitriolic: for this acid forms with the diſſolved lime a ſelenitic concrete, which precipitates along with the ſulphur, and is not afterwards ſeparable by any ablution; whilſt the neutral ſalt, which that acid forms with the fixed alkali of the hepar, may be totally diſſolved and waſhed off by repeated ablution with hot water, and the combinations of all the other acids, both with the lime and alkali, are ſeparated by cold water. It is probably to the admixture of the white ſelenitic matter, reſulting from the vitriolic acid and lime, that the finer colour of the preparation made with lime is owing.

---

† See *Chemiſtry*, nº 321.

Pure lac ſulphuris is not different in quality from pure ſulphur itſelf; to which it is preferred in unguents, &c. only on account of its colour. The whiteneſs does not proceed from the ſulphur having loſt any of its parts in the operation, or from any new matter ſuperadded: for if common ſulphur be ground with alkaline ſalts, and ſet to ſublime, it ariſes of a like white colour, the whole quantity of the alkali remaining unchanged; and if the lac be melted with a gentle fire, it returns into yellow ſulphur again.

It may be obſerved, that the name *lac ſulphuris*, or "milk of ſulphur," applied among us to the precipitate, is by the French writers confined to the white liquor before the precipitate has fallen from it.

723. *Volatile tincture of ſulphur.*

Take of flowers of ſulphur, ſix ounces; ſal ammoniac, one pound; quicklime, a pound and a half. Sprinkle ſome water on the lime; and, when ſlaked and fallen into powder, grind it firſt with the ſulphur, and afterwards with the ſal ammoniac, in ſmall quantities at a time: then diſtil the mixture in a retort, with a fire gradually increaſed. The diſtilled liquor is to be kept, in a bottle cloſe ſtopped, for uſe.

This liquor has a ſtrong offenſive ſmell: the vapour ſpreads to a conſiderable diſtance, changes ſilver or copper utenſils to a brown or blackiſh colour, and produces diſagreeable alterations in many medical preparations: to this circumſtance, therefore, due regard ought to be had in the performance of that proceſs, and in the keeping of this tincture. If a piece of paper, written upon with a ſaturated ſolution of lead in vegetable acids, and gently dried, be placed in the middle of a quire of paper, or of a pretty thick book, and brought near the unſtopped orifice of the bottle containing this tincture, the vapour will quickly reach it, and change the colourleſs writing to a legible black.

Hoffman has a great opinion of the virtues of this preparation. He ſays, a mixture of one part of the tincture with three of ſpirit of wine, in a doſe of 30 or 40 drops, proves a moſt powerful diaphoretic; and that a liquor compoſed of this and camphor, takes off the pain of the gout, by bathing the feet with it. This tincture may be a powerful medicine, but it is certainly a very unpleaſant one.

SECT. X. *Metallic Preparations.*

§ 1. PREPARATIONS OF GOLD.

724. GOLD is the moſt ponderous and perfect of the metals: it abides fixed and unaltered in the ſtrongeſt fire; and is not acted upon by alkaline, or any ſimple acid menſtruum. It diſſolves in aqua regia alone, into a yellowiſh tranſparent fluid: this ſolution ſtains the ſkin, &c. purple; the ethereal ſpirit of wine, and ſome eſſential oils, take up the gold from it: alkalies precipitate the metal in form of a yellowiſh mud, which exſiccated, and expoſed to a ſmall heat, violently explodes.

As to the medicinal virtues of this metal, experience has ſufficiently ſhown, that it is not poſſeſſed of any valuable ones. In its metallic form, however finely comminuted, it proves inactive; when ſatiated with acid, corroſive; and in the intermediate ſtates, either inſignificant or unſafe.

725. *Potable gold.*

Diſſolve with a moderate heat, half a dram of fine gold, in two ounces of aqua regia; and add to the ſolution one ounce of the eſſential oil of roſemary. Shake them together, and then ſuffer them to reſt: the acid loſes its gold yellow colour; and the oil, which ariſes to the ſurface, becomes richly impregnated therewith. Separate the oil by decantation, and add to it four or five ounces of rectified ſpirit of wine: digeſt this mixture for a month, and it will acquire a purpliſh colour.

There have been many preparations of this kind contrived by the deſigning pretenders to alchemy, and impoſed upon the credulous and unwary, as cordials and diaphoretics of ineſtimable value. The above ſeems to be one of the beſt and ſafeſt of them; though it would be equally ſerviceable as a medicine, if made without the ingredient which it receives its name from. The gold is indeed taken up from the acid, and kept for a time diſſolved by the oil; but on ſtanding, it totally ſeparates, in form of fine yellow films, like leaf-gold. The effect is the ſame, whether the oil or the vinous ſpirit be mixed with the ſolution of the gold in aqua regia: the only difference is, that the gold is thrown off from the oil to the ſides of the glaſs; whilſt the ſpirit revives it into ſuch ſubtle films, as to float upon the ſurface of the liquor. No means have yet been found of permanently combining gold with either oils or vinous ſpirits.

§ 2. PREPARATIONS OF SILVER.

726. SILVER is the moſt permanent in the fire of all the metals after gold. It diſſolves in the pure nitrous acid, into a colourleſs tranſparent liquor, intenſely bitter and corroſive. This ſolution exſiccated, furniſhes the ſhops with an uſeful cauſtic; which has likewiſe been taken internally, in ſmall doſes, and mixed with other ſubſtances, as an hydragogue: it ſtains the ſkin black.

727, a. *The lunar cauſtic.* L.

Let pure ſilver be diſſolved in about twice its weight of aquafortis, upon warm ſand; then gently increaſe the heat, until a dry maſs is left. Melt this in a crucible, that it may be poured into proper moulds, carefully avoiding overmuch heat, leſt the matter ſhould grow too thick.

727, b. *The lunar cauſtic, or infernal ſtone.* E.

Take four ounces of well-cupelled ſilver, flatted into plates, and cut in pieces. Diſſolve it, by the heat of a ſand-bath, in a mixture of eight ounces of weak ſpirit of nitre, and four ounces of water. Evaporate the ſolution to dryneſs, and put the remaining calx into a large crucible. Let the fire at firſt be gentle, and augment it by degrees, until the maſs flows like oil, and ceaſes to fume: then pour it into to iron pipes made for this purpoſe, previouſly heated and greaſed: laſtly, let it be dried and kept for uſe in a glaſs veſſel cloſely ſtopped.

The crucible ought to be large enough to hold five or ſix times the quantity of the dry matter; for it bubbles and ſwells up greatly, ſo as otherwiſe to be apt to run over: during this time, alſo, little drops are now and then ſpirted up, whoſe cauſticity is increaſed by their heat, and which the operator ought therefore to be on his guard againſt. The fire muſt be kept moderate till this ebullition ceaſes, and till the matter becomes conſiſtent in the heat that made it boil before: then quickly increaſe the fire till the matter flows thin at the bottom, like oil; on which it is to be immediately poured into the mould, without waiting till the fumes ceaſe to appear; for when this happens, the preparation proves not only too thick to run freely into the mould, but likewiſe leſs corroſive than it is expected to be.

In want of a proper iron mould, one may be formed of tempered tobacco-pipe-clay, not too moiſt, by making in a lump of it, with a ſmooth ſtick firſt greaſed, as many holes as there is occaſion for; pour the liquid matter into theſe cavities, and, when congealed, take it out by breaking the mould. Each piece is to be wiped clean from the greaſe; and wrapt up in dry ſoft paper, not only to keep the air from acting upon them, but likewiſe to prevent their corroding or diſcolouring the fingers in handling.

This preparation is a ſtrong cauſtic, and frequently employed as ſuch for conſuming warts and other fleſhy excreſcences, keeping down fungous fleſh in wounds or ulcers, and other like uſes. It is rarely applied where a deep eſchar is required, as in the laying open of impoſthumations and tumours; for the quantity neceſſary for theſe purpoſes, liqueſying by the moiſture of the ſkin, ſpreads beyond the limits in which it is intended to operate.

728. *The lunar pills.*

Diſſolve pure ſilver in aquafortis; and after due evaporation, ſet the liquor to cryſtallize. Let the cryſtals be again diſſolved in common water, and mingled with a ſolution of equal their weight of nitre. Evaporate this mixture to dryneſs, and continue the exſiccation with a gentle heat, keeping the matter conſtantly ſtirring till no more fumes ariſe.

Here it is neceſſary to continue the fire till the fumes entirely ceaſe, as more of the acid is required to be diſſipated than in the preceding proceſs. The preparation is, nevertheleſs, in taſte very ſharp, intenſely bitter, and nauſeous; applied to ulcers, it acts as a cauſtic, but much milder than the foregoing. Boerhaave, Boyle, and others, greatly commend it in hydropic caſes. The former aſſures us, that two grains of it made into a pill, with a crumb of bread and a little ſugar, and taken on an empty ſtomach, (ſome warm water, ſweetened with honey, being drank immediately after), purge gently without griping, and bring away a large quantity of water, almoſt without the patient's perceiving it: that it kills worms, and cures many inveterate ulcerous diſorders. He nevertheleſs cautions againſt uſing it too freely, or in too large a doſe; and obſerves, that it always proves corroſive and weakening, eſpecially to the ſtomach.

§. 3. PREPARATIONS OF IRON.

729. Iron calcines by fire the moſt eaſily, and melts the moſt difficultly of all the metals. Sulphur promotes its fuſion, and changes it into a ſubſtance not greatly diſſimilar to a combination of the metal with acid. All acids diſſolve this metal; even the air corrodes it into a ruſt or calx.

Iron, in its metallic form, or lightly calcined, or combined with vegetable or with mineral acids, acts in the human body in the ſame manner (but with different degrees of power) by conſtringing the fibres. In all theſe ſtates, it promotes or reſtrains ſecretions, where the deficiency or exceſs proceed from a laxity and debility of the veſſels; and, in general, raiſes the pulſe, and quickens the circulation. The calces ſeem to be the leaſt active preparations; the crude metal duly comminuted, is more eaſily ſoluble in the animal fluids, and, if aceſcent juices are lodged in the primæ viæ, ſoon manifeſts its operation by nidorous eructations, and the black colour of the alvine fæces; if previouſly combined with ſaline bodies, it ſcarce ever fails of taking effect.

735. As the calces of iron are ſcarcely diſſoluble in acids, it has been concluded that they are not ſoluble in the human body, and that therefore they are to be looked upon no otherwiſe than as a mere inactive earth. But admitting the abſolute indiſſolubility of iron while it continues a calx, it muſt be obſerved, that the calces of this metal are remarkably eaſy of revival into their metallic ſtate. Mr Beaume relates, that calx of iron, digeſted for an hour or two in oil-olive, reſumes its perfect metallic nature, ſo as to be attracted by the magnet, and totally ſoluble in acids; from whence he infers, that a like revival of the metal happens in the human body. It is matter of common obſervation, that calces of iron tinge the excrements black, a ſure mark of their taking effect: though their effect appears to be neither ſo ſpeedy nor ſo great as that of iron in ſome other forms.

730. *Ruſt of ſteel prepared.* L.

Expoſe filings of ſteel to the air, frequently moiſtening them with vinegar or water, until they change into ruſt: then grind them in a mortar; and, pouring on water, waſh over the more ſubtle powder. The remainder is to be expoſed afreſh to the air, and moiſtened as at firſt; then triturated and waſhed again; and the powders that have been waſhed over, dried and kept for uſe.

The ruſt of iron is preferable as a medicine to the calces, or croci, made by a ſtrong fire. Hoffman relates, that he has frequently given it with remarkable ſucceſs in obſtinate chlorotic caſes, accompanied with exceſſive headachs and other violent ſymptoms; and that he uſually joined it with pimpinella, arum root, and ſalt of tartar, with a little cinnamon and ſugar. The doſe is from four or five grains to 20 or 30: ſome have gone as far as a dram; but all the preparations of this metal anſwer beſt in ſmall doſes, which ſhould rather be often repeated than enlarged.

731. *Scales of iron prepared.* E.

The ſcales beat off from pieces of iron when hammered on the anvil are to be cleanſed by a magnet; thoſe which the magnet attracts being kept for uſe.

732. *Martial ethiops.*

Put filings of ſteel into an unglazed earthen veſſel, with ſo much water as will ſtand above them about four inches; the whole is to be well ſtirred every day, and more water ſupplied as that in the veſſel exhales, ſo that the filings may remain always covered: continue this procedure for ſeveral months, till they loſe their metallic aſpect, and are reduced to a fine powder of an inky blackneſs.

This preparation is deſcribed by Lemery in the memoirs of the French academy. But the tediousneſs of the proceſs has prevented its coming into uſe; eſpecially as it does not promiſe any advantage above the common chalybeate preparations, to counterbalance that inconvenience.

733. *Steel prepared with ſulphur.* L.

Heat the ſteel with a very fierce fire to a ſtrong white heat, and in this ſtate apply it to a roll of ſulphur held over a veſſel of water: the ſteel will melt, and fall down in drops, which are to be picked out from the ſulphur that runs down with them, and ground into an impalpable powder.

The ſhops have been generally ſupplied with a preparation of ſteel with ſulphur made at an eaſier rate in the following manner.

734. *Sulphurated iron.*

Mix filings of iron with twice their weight of powdered ſulphur, and as much water as is ſufficient to make them into a paſte; which on ſtanding at reſt for ſix hours, will ſwell up. The matter is then to be pulverized, put by degrees into a hot crucible to deflagrate, and kept continually ſtirring with an iron ſpatula till it falls into a deep black powder.

If the quantity of this mixture is conſiderable, and ſtrongly preſſed down, it will not only ſwell on ſtanding for ſome hours, but will heave up very weighty obſtacles, and burſt out into flame.

735. *Opening crocus of iron.*

This is made by keeping the foregoing preparation longer over the fire, till it aſſumes a red colour.

736. *Aſtringent crocus of iron.*

This is made from the opening crocus of iron, by reverberating it for a long time in the moſt extreme degree of heat.

Theſe preparations differ from one another in virtue; though the difference is not of ſuch a kind as the titles they have been uſually diſtinguiſhed by import. All the preparations of ſteel act by an aſtringent quality; that above, denominated *aſtringent*, ſeems to have the leaſt effect. They may be given in form of bolus, electuary, or pill, from ſix grains to a ſcruple.

In ſome foreign pharmacopœias, the croci of iron are prepared from pure green vitriol. This ſtrongly calcined (or the colcothar remaining after the diſtillation of oil of vitriol), is the *aſtringent crocus*; when leſs calcined, it is called *aperient*. Theſe preparations differ little, if at all, from thoſe above diſtinguiſhed by the ſame appellations: and accordingly the Edinburgh college has now allowed the ſubſtitution of colcothar of vitriol to both the croci.

737. *Soluble or tartarized ſteel.* E.

Mix equal parts of iron filings and cryſtals of tartar, with as much water as is ſufficient to reduce them into a maſs: this maſs is to be dried in a ſand-heat; then powdered, moiſtened, and dried again; and this proceſs repeated, till ſuch time as the matter will eaſily grind into an impalpable powder.

This is a very elegant and uſeful preparation of ſteel. It may be given either in a liquid form, or in that of a bolus, &c. in doſes of four five grains, or half a ſcruple. Dr Willis is ſaid to have been the inventor of this preparation, and by his name it has been uſually diſtinguiſhed in the ſhops.

738. *Martial flowers.* L.

Take of colcothar of green vitriol waſhed, or filings of iron, one pound; ſal ammoniac, two pounds. Mix and ſublime in a retort. Grind the flowers with the matter which remains in the bottom of the retort, and repeat the ſublimation until the flowers ariſe of a beautiful yellowiſh colour. To the reſiduum you may add half a pound of freſh ſal ammoniac, and ſublime as before; repeating this as long as the flowers ariſe well coloured.

This preparation is ſuppoſed to be highly aperient and attenuating; though no otherwiſe ſo than the reſt of the chalybeates, or at moſt only by virtue of the ſaline matter joined to the iron. It has been found of good ſervice in hyſterical and hypochondriacal caſes, and in diſtempers proceeding from a laxity and weakneſs of the ſolids, as the rickets. It may be conveniently taken in the form of a bolus, from two or three grains to ten: it is nauſeous in a liquid form (unleſs in ſpirituous tincture), and occaſions pills to ſwell and crumble except ſuch as are made of the gums.

739. *Salt of ſteel.* L.

Take of ſtrong ſpirit or oil of vitriol, eight ounces; iron filings, four ounces; water, two pints. Mix them together; and after the ebullition ceaſes, let the mixture ſtand for ſome time upon a warm ſand; then pour off and filter the liquor; and after proper exhalation ſet it by to cryſtallize.

The ſalt of ſteel is one of the moſt efficacious preparations of this metal; and not unfrequently made uſe of in cachectic and chlorotic caſes, for exciting the uterine purgations, ſtrengthening the tone of the viſcera, and deſtroying worms. It may be conveniently taken in a liquid form, largely diluted with aqueous fluids. Boerhaave directs it to be diſſolved in an hundred times its quantity of water, and the ſolution to be taken in the doſe of 12 ounces, on an empty ſtomach, walking gently after it; thus managed, he ſays, it opens the body, purges, proves diuretic, kills and expels worms, tinges the excrements black, or forms them into a matter like clay, ſtrengthens the fibres, and thus cures many different diſtempers. The quantity of vitriol in the above doſe of the ſolution is 57 grains and a half: but in common practice, ſuch large doſes of this ſtrong chalybeate are never ventured on. Four or five grains, and in many caſes half a grain, are ſufficient for the intentions in which chalybeate medicines are given. Very dilute ſolutions, as that of a grain of the ſalt in a pint of water, may be uſed as ſuccedanea to the natural chalybeate waters, and will in many caſes produce ſimilar effects.

§ 4. PREPARATIONS of COPPER.

740. COPPER is leſs eaſy of ſolution than iron; and in its metallic ſtate, does not appear to be acted on by the animal fluids, or to have any conſiderable effect in the body. Diſſolved, it proves externally an eſcharotic; internally, a violent purgative and emetic. Acids of every kind diſſolve it, and likewiſe volatile alkalies. With the vegetable and marine acids, it forms a green ſolution; with the vitriolic acid and volatile alkalies, a blue.

741. *Volatile tincture of copper.*

Take of copper filings, one dram; ſpirit of ſal ammoniac, 12 drams. Let them ſtand together in a cloſe veſſel, frequently ſhaking it, until the liquor is tinged of a beautiful violet colour.

This tincture, or ſolution, of copper has been given internally, in the doſe of a few drops, as a diuretic. Boerhaave directs at firſt three drops to be taken in a morning faſting, with a glaſs of mead; and this doſe to be daily doubled till it comes to 24 drops; which laſt quantity is to be continued for ſome days: he ſays, that by this means he cured an hydropic perſon labouring under a confirmed aſcites, and that the medicine procured ſurpriſing diſcharges of urine; that nevertheleſs, on trying it in another caſe of the ſame kind, it did not anſwer.

742. *Ammoniacal copper.* E.

Take of blue vitriol, two ounces; diſſolve it in ſix ounces of boiling water, gradually drop in as much ſpirit of ſal ammoniac as will firſt precipitate, and then entirely diſſolve the metal. Evaporate the liquor with a very gentle heat, and keep the blue ſaline maſs in bottles well ſtopped.

§ 5. PREPARATIONS of LEAD.

743. LEAD readily melts in the fire, and calcines into a duſky powder; which, if the flame is reverberated on it, becomes at firſt yellow, then red, and at length melts into a vitreous maſs. This metal diſſolves eaſily in the nitrous acid, difficultly in the vitriolic, and in ſmall quantity in the vegetable acids; it is alſo ſoluble in expreſſed oils, eſpecially when calcined.

Lead and its calces, whilſt undiſſolved, have no conſiderable effects as medicines. Diſſolved in oils, they are ſuppoſed to be (when externally applied) anti-inflammatory and deſiccative. Combined with vegetable acids, they are notably ſo; and taken internally, prove a powerful but dangerous ſtyptic.

744. *Minium, or red lead.*

Let any quantity of lead be melted in an unglazed earthen veſſel, and kept ſtirring with an iron ſpatula, till it falls into a powder, at firſt blackiſh, afterwards yellow, and at length of a deep red colour, in which laſt ſtate it is called *minium;* taking care not to raiſe the fire ſo high as to run the calx into a vitreous maſs.

Theſe calces are employed in external applications, for abating inflammations, cleanſing and healing ulcers, and the like. Their effects, however, are not very conſiderable; nor are they perhaps of much farther real uſe, than as they give conſiſtence to the plaſter, unguent, &c.

745. *Ceruſſe, or white lead.* E.

Put ſome vinegar into the bottom of an earthen veſſel, and ſuſpend over the vinegar very thin plates of lead, in ſuch a manner that the vapour which ariſes from the acid may circulate about the plates. Set the containing veſſel in the heat of horſe-dung, for three weeks: if at the end of this time the plates are not totally calcined, ſcrape off the white powder, and expoſe them again to the ſteam of vinegar, till all the lead is thus corroded into powder.

In this operation the lead is ſo far opened by the acid, as to diſcover, when taken internally, the malignant quality of the metal; and to prove externally, when ſprinkled on running ſores, or ulcers, moderately cooling, drying, and aſtrictive.

746. *Sugar of lead.*

Boil ceruſſe with diſtilled vinegar in a leaden veſſel, until the vinegar becomes ſufficiently ſweet; then filter the vinegar through paper, and after due evaporation ſet it to cryſtallize. *L.*

Put any quantity of ceruſſe into a cucurbit, and pour thereon diſtilled vinegar to the height of four inches. Digeſt them together for ſome days in a ſand-heat, till the vinegar has acquired a ſweetiſh taſte; when it is to be ſuffered to ſettle, and then poured off. Add freſh vinegar to the remainder, and repeat this proceſs till the menſtruum no longer extracts any ſweet taſte. Let all the impregnated liquors reſt for ſome time; and after they have been poured from the fæces, evaporate them in a glaſs veſſel, to the conſiſtence of thin honey; ſo that upon being ſet in a cool place, the ſugar may ſhoot into cryſtals, which are afterwards to be dried in the ſhade. Exhale the remaining liquor to a pellicle, ſet it again in the cold, and more cryſtals will ſhoot; repeat this operation till no cryſtals can any longer be obtained. E.

The ſugar of lead is much more efficacious than the foregoing preparations, in the ſeveral intentions which they are applied to. Some have ventured upon it internally, in doſes of a few grains, as a ſtyptic, in hæmorrhages, profuſe colliquative ſweats, ſeminal fluxes, the fluor albus, &c. nor has it failed their expectations. It very powerfully reſtrains the diſcharge; but almoſt as certainly as it does this, it occaſions ſymptoms of another kind, often more dangerous than thoſe removed by it, and ſometimes fatal. Violent pains in the bowels or through the whole body, and obſtinate conſtipations, ſometimes immediately follow, eſpecially if the doſe has been conſiderable; cramps, tremors, and weakneſs of the nerves, generally, ſooner or later enſue.

§ 6. PREPARATIONS of TIN.

747. TIN eaſily melts in the fire, and calcines into a duſky powder, which by a farther continuance of the heat becomes white. A maſs of tin heated till it is juſt ready to melt proves extremely brittle, ſo as to fall in pieces from a blow, and by dextrous agitation into powder. Its proper menſtruum is aqua regia; though the other mineral acids alſo may be made to diſſolve it, and the vegetable ones, in ſmall quantity. It cryſtal-

lizes with the vegetable and vitriolic acids; but with the others, deliquiates.

The virtues of this metal are little known. It has been recommended as an antihyſteric, antihectic, &c. At preſent it is chiefly uſed as an anthelmintic.

748. *Powdered tin.* L.

Melt the tin, and pour it into a wooden box rubbed in the inſide with chalk: then immediately let the box be nimbly ſhaken, and a part of the tin will fall into powder. The remainder is to be melted a ſecond time, and treated in the ſame manner, till the whole of the metal is thus reduced into powder.

This preparation has been uſed for ſome time as a remedy againſt worms, particularly the flat kinds, which too often elude the force of other medicines. The general doſe is from a ſcruple to a dram; ſome confine it to a few grains. But Dr Alſton aſſures us, in the Edinburgh Eſſays, that its ſucceſs chiefly depends upon its being given in much larger quantities: he gives an ounce of the powder on an empty ſtomach, mixed with four ounces of melaſſes; next day, half an ounce; and the day following, half an ounce more; after which, a cathartic is adminiſtered: he ſays the worms are uſually voided during the operation of the purge, but that pains of the ſtomach occaſioned by them are removed almoſt immediately upon taking the firſt doſe of the tin.

§ 7. PREPARATIONS of MERCURY.

749. MERCURY, or quickſilver, is a ponderous metallic fluid, totaly volatile in a ſtrong fire, and calcinable by a weaker one (tho' very difficultly) into a red powdery ſubſtance. It diſſolves in the nitrous acid, is corroded by the vitriolic, but not acted on by the marine in its liquid ſtate: it nevertheleſs may be combined with this laſt, if ſkilfully applied in the form of fume. Quickſilver unites, by trituration, with earthy, unctuous, reſinous, and other like ſubſtances, ſo as to loſe its fluidity: triturated with ſulphur, it forms a black maſs, which by ſublimation changes to a beautiful red one.

The general virtues of the mercurial preparations are, to fuſe the juices, however viſcid, in the minuteſt and remoteſt veſſels; by this means they prove eminently ſerviceable in inveterate chronical diſorders, proceeding from a thickneſs and ſluggiſhneſs of the humours, and obſtinate obſtructions of the glands. Crude mercury has no effect this way. Reſolved into fume, or divided into minute particles, and prevented from re-uniting by the interpoſition of other ſubſtances, it operates very powerfully; unleſs the dividing body be ſulphur, which reſtrains its action. Combined with a ſmall quantity of the mineral acids, it acts effectually, though in general mildly; with a larger, it proves violently corroſive.

750. *Purification of quickſilver.* L.

Diſtil quickſilver in a retort; and afterwards waſh it with water and common ſalt, or with vinegar.

If a glaſs retort is made uſe of for this operation, it ought to have a low body, and a long neck; and the neck ſhould be conſiderably inclined downwards, ſo as to allow the elevated mercury a quick deſcent: the receiver ſhould be filled almoſt to the neck of the retort with water; the uſe of this is not to condenſe, but to cool, the diſtilling quickſilver, leſt falling hot upon the bottom it ſhould crack the glaſs. The diſtillation may be more conveniently performed in an iron retort, or an iron pot fitted with a head.

The fire ſhould be raiſed no higher than is ſufficient to elevate the mercury; for certain mineral ſubſtances, which are ſaid to be ſometimes mixed with it, prove in part volatile in a degree of heat not much greater than that in which mercury diſtils. Mr Boyle relates, that he has known quickſilver carry up with it a portion even of lead, ſo as to have its weight very ſenſibly increaſed thereby; and this happened tho' only a moderate fire was uſed.

751. *Sugared mercury.*

Take pure quickſilver, brown ſugar-candy, of each half an ounce. Eſſential oil of juniper-berries, 16 drops. Grind them together in a glaſs mortar, until the mercury ceaſes to appear.

The eſſential oil, here added, is ſaid to be a very uſeful ingredient; not only promoting the extinction of the quickſilver (which, however, is ſtill not a little difficult and tedious), but likewiſe improving the medicine. The intention is only to divide the mercury by the interpoſition of other bodies; for when thus managed, it has very powerful effects; tho' whilſt undivided, it ſeems to be altogether inactive. Sugar alone apparently anſwers this intention; but on the commixture of aqueous fluids, the ſugar diſſolves by itſelf, leaving the mercury to run together again in its original form: the addition of the oil is ſaid in great meaſure to prevent this inconvenience. The doſe of this medicine, as an alterative, is from two or three grains to a ſcruple.

752. *Ethiops mineral.*

Take purified quickſilver, flowers of ſulphur, unwaſhed, of each equal weights. Grind them together in a glaſs or ſtone mortar, until they are united. *L.*

Take of purified quickſilver, flowers of ſulphur, each equal weights. Grind them together in a glaſs mortar, with a glaſs peſtle, till the mercurial globules totally diſappear. *E.*

An ethiops is made alſo with a double quantity of mercury.

The union of the mercury and ſulphur might be greatly facilitated by the aſſiſtance of a little warmth. Some are accuſtomed to make this preparation in a very expeditious manner, by melting the ſulphur in an iron ladle, then adding the quickſilver, and ſtirring them together till the mixture is completed. The ſmall degree of heat here ſufficient, cannot reaſonably be ſuppoſed to do any injury to ſubſtances which have already udergone much greater fires, not only in the extraction from their ores, but likewiſe in the purifications of them directed in the pharmacopœia. In the following proceſs, they are expoſed in conjunction to a ſtrong fire, without ſuſpicion of the compound receiving any ill quality from it. Thus much is certain, that the ingredients are more perfectly united by heat, than by the degree of triture uſually beſtowed upon them. From the ethiops prepared by triture, part of the mercury is apt to be ſpued out on making it into an electuary or pills: from that made by fire, no ſeparation is obſerved to happen.

Ethiops mineral is one of the moſt inactive of the mercurial preparations. Some practitioners have boldly aſſerted its poſſeſſing extraordinary virtues; and moſt people imagine it a medicine of ſome efficacy. But what benefit is to be expected from it in the common doſes of eight or ten grains, or a ſcruple, may be judged from hence, that it has been taken in doſes of ſeveral drams, and continued for a conſiderable time, without producing any remarkable effect. Sulphur eminently abates the power of all the more active minerals, and ſeems to be at the ſame time reſtrained by them from operating in the body itſelf. Boerhaave, who is in general ſufficiently liberal in the commendation of medicines, diſapproves the ethiops in very ſtrong terms. "It cannot enter the abſorbent veſſels, the lacteals, or lymphatics; but paſſes directly through the inteſtinal tube, where it may happen to deſtroy worms, if it operates luckily. They are deceived who expect any other effects from it; at leaſt I myſelf could never find them. I am afraid, it is unwarily given, in ſuch large quantities, to children and perſons of tender conſtitutions; as being a foreign maſs, unconquerable by the body, the more to be ſuſpected, as it continues long, ſluggiſh, and inactive. It does not raiſe a ſalivation, becauſe it cannot come into the blood. Who knows the effects of a ſubſtance, which, ſo long as it remains compounded, ſeems no more active than any inſipid ponderous earth!" The ethiops with a double proportion of mercury, received into the former edition of the Edinburgh pharmacopœia, has a greater chance for operating as a mercurial; and probably the quantity of mercury might be ſtill further increaſed to advantage.

753. *Artificial cinnabar.* E.

Take of purified quickſilver, three pounds and a half; flowers of ſulphur, waſhed, one pound. Melt the ſulphur in a large iron veſſel, over a gentle fire; and add to it by degrees the quickſilver previouſly heated, ſtirring them conſtantly together with an iron ſpatula that they may be perfectly mixed. Immediately fit upon the veſſel a wooden cover, to prevent the mixture from taking fire: before the matter is grown cold, grind it into powder, and ſublime according to art.

It has been cuſtomary to order a larger quantity of ſulphur than here directed: but this ſmaller proportion anſwers better; for the leſs ſulphur, the finer coloured is cinnabar.

The principal uſe of cinnabar is as a pigment. It was formerly held in great eſteem as a medicine, in cutaneous foulneſſes, gouty and rheumatic pains, epileptic caſes, &c. but of late it has loſt much of its reputation. It appears to be nearly ſimilar to the *ethiops*, already ſpoken of. Cartheuſer relates, that having given cinnabar in large quantities to a dog, it produced no ſenſible effect; but was partly voided along with the fæces unaltered, and partly found entire in the ſtomach and inteſtines, upon opening the animal. The celebrated Frederick Hoffman, after beſtowing high encomiums on this preparation, as having in many inſtances within his own knowledge perfectly cured epilepſies and vertigoes from contuſions of the head (where it is probable, however, that the cure did not ſo much depend upon the cinnabar, as on the ſpontaneous recovery of the parts from the external injury) obſerves, that the large repeated doſes, neceſſary for having any effect, can be borne only where the firſt paſſages are ſtrong; and that if the fibres of the ſtomach and inteſtines are lax and flaccid, the cinnabar, accumulated and concreting with the mucuous matter of the parts, occaſions great oppreſſion: Which ſeems to be an acknowledgment that the cinnabar is not ſubdued by the powers of digeſtion, and has no proper medicinal activity. There are indeed ſome inſtances of the daily uſe of cinnabar having brought on a ſalivation; perhaps from the cinnabar, made uſe of in thoſe caſes, having contained a leſs proportion of ſulphur than the ſorts commonly met with. The regulus of antimony, and even white arſenic, when combined with a certain quantity of common ſulphur, ſeem to have their deleterious power deſtroyed: on ſeparating more and more of the ſulphur, they exert more and more of their proper virulence. It does not ſeem unreaſonable to preſume, that mercury may have its activity varied in like manner; that when perfectly ſatiated with ſulphur, it may be inert; and that when the quantity of ſulphur is more and more leſſened, the compound may have greater and greater degrees of the proper efficacy of mercurials.

Cinnabar is ſometimes uſed in fumigations againſt venereal ulcers in the noſe, mouth, and throat. Half a dram of it burnt, the fume being imbibed with the breath, has occaſioned a violent ſalivation. This effect is by no means owing to the medicine as cinnabar: when ſet on fire, it is no longer a mixture of mercury and ſulphur; but mercury reſolved into fume, and blended in part with the volatile vitriolic acid; in either of which circumſtances, this mineral, as already obſerved, has very powerful effects.

754. *Calcined mercury.* L.

Put purified quickſilver into a broad-bottomed glaſs veſſel, having a ſmall hole open to the air, and keep it in a conſtant heat, in a ſand-furnace, for ſeveral months, until it is calcined into a red powder.

This tedious proceſs might, in all probability, be greatly expedited, by employing, inſtead of a veſſel with a ſmall aperture, a very wide-mouthed, flat-bottomed glaſs body, of ſuch a height that the mercury may not eſcape: by this means, the air, which is eſſentially neceſſary to the calcination of all metallic ſubſtances, will be more freely admitted. A veſſel might be ſo contrived, as to occaſion a continual flux of air over the ſurface of the mercury.

This preparation is by ſome highly eſteemed in venereal caſes, and ſuppoſed to be the moſt efficacious and certain of all the mercurials. It may be advantageouſly given in conjunction with opiates; a bolus or pill, containing from half a grain to two grains of this calx, and a quarter or half a grain or more of opium, with the addition of ſome warm aromatic ingredient, may be taken every night. Thus managed, it acts mildly, though powerfully, as an alterative and diaphoretic: given by itſelf in larger doſes, as four or five grains, it proves a rough emetic and cathartic.

755. *Solution of mercury.*

Take equal quantities of pure quickſilver, and good aquafortis. Digeſt them together in a phial placed in a ſand-furnace, that a limpid ſolution may be made.

Aquafortis diſſolves mercury more eaſily, and in larger quantity, than any other acid: 16 ounces, if the menſtruum is very ſtrong and pure, will take up 11 or 12. As the liquor grows cold, a conſiderable part concretes, at the bottom of the veſſel, into a cryſtalline form. If the whole is wanted to remain ſuſpended, a proper quantity of water ſhould be added after the ſolution is completed.

This proceſs is given only as preparatory to ſome of the following ones. The ſolution is highly cauſtic, ſo as ſcarce to be ſafely touched. It ſtains the ſkin purple or black.

756. *Calx of mercury.*

Take any quantity of the ſolution of mercury, and evaporate it over a gentle fire, till a white dry maſs remains.

This calx, or rather ſalt, of mercury, is violently corroſive. It is rarely made uſe of any otherwiſe than for making the following preparation and the corroſive ſublimate.

757. *Red calx of mercury, commonly called* red precipitate. E.

Take any quantity of the calx of mercury, and reverberate it in a crucible with ſucceſſive degrees of heat. Its white colour will change firſt into a brown, and afterwards a yellow; at length, upon increaſing the fire, it paſſes into a deep red.

758. *The red mercurial corroſive.* L.

Take of purified quickſilver, compound aquafortis (A), of each equal weights. Mix, and ſet them in a broad-bottomed veſſel, in a ſand-heat, till all the humidity is exhaled, and the maſs has acquired a red colour.

The marine acid in the compound menſtruum ordered in this laſt proceſs, diſpoſes the mercurial calx to aſſume the bright ſparkling look admired in it; which, though perhaps no advantage to it as a medicine, ought nevertheleſs to be inſiſted on by the buyer as a mark of its goodneſs and ſtrength. As ſoon as the matter has gained this appearance, it ſhould be immediately removed from the fire, otherwiſe it will ſoon loſe it again. The preparation of this *red precipitate*, as it is called, in perfection, is ſuppoſed by ſome to be a ſecret not known to our chemiſts; inſomuch that we are under a neceſſity of importing it from abroad. This reflection ſeems to be founded on miſinformation: we ſometimes indeed receive conſiderable quantities from Holland; but this depends upon the ingredients being commonly cheaper there than with us, and not upon any ſecret in the manner of the preparation.

This precipitate is, as its title imports, an eſcharotic; and in this intention is frequently employed by the ſurgeons, with baſilicum, and other dreſſings, for conſuming fungous fleſh in ulcers, and the like purpoſes. It is ſubject to great uncertainty in point of ſtrength; more or leſs of the acid exhaling, according to the degree and continuance of the fire. The beſt criterion of its ſtrength, as already obſerved, is its brilliant appearance; which is alſo the mark of its genuineneſs: if mixed with minium, which it is ſometimes ſaid to be, the duller hue will diſcover the abuſe. This admixture may be more certainly detected by means of fire: the mercurial part will totally evaporate, leaving the minium behind.

Some have ventured to give this medicine internally, in venereal, ſcrophulous, and other obſtinate chronic diſorders, in doſes of two or three grains and more. But certainly, the milder mercurials, properly managed, are capable of anſwering all that can be expected from this; without occaſioning violent anxieties, tormina of the bowels, and other ill conſequences, which the beſt management can ſcarcely prevent this corroſive preparation from ſometimes doing.

759. *The white mercurial corroſive*, or *corroſive mercury ſublimate.*

Take of purified quickſilver, forty ounces; ſea-ſalt, thirty-three ounces; nitre, twenty-eight ounces; calcined green vitriol, ſixty-ſix ounces. Grind the quickſilver, in a wooden or ſtone mortar, with an ounce or more of corroſive mercury ſublimate already made, until the quickſilver is divided into ſmall grains: this mixture is to be ground with the nitre, and afterwards with the ſea-ſalt; then add the calcined vitriol, continuing the triture only for a little time longer, leſt the quickſilver ſhould run together again. Laſtly, proceed to ſublimation, in a glaſs matraſs; to which you may adapt a head, in order to ſave a little ſpirit that will come over. *L.*

Take of quickſilver, and weak ſpirit of nitre, of each four ounces; calcined ſea-ſalt and calcined vitriol, of each five ounces; diſſolve the quickſilver in the acid, and let the mixture be evaporated almoſt to dryneſs; then add the vitriol and ſea-ſalt, and ſublime the mixture in a proper veſſel. *E.*

The ſublimate made by this method is the ſame with the foregoing; but as the quantity of fixed matter is ſmall, it difficultly aſſumes the form of a cake. It requires indeed ſome ſkill in the operator, to give it this appearance when either proceſs is followed. When large quantities are made, this form may be eaſily obtained, by placing the matraſs no deeper in the ſand than the ſurface of the matter contained in it; and removing a little of the ſand from the ſides of the glaſs, as ſoon as the flowers begin to appear in the neck; when the heat ſhould likewiſe be ſomewhat lowered, and not at all raiſed during the whole proceſs. The ſublimation is known to be completed by the edges of the cryſtalline cake, which will form upon the ſurface of the caput mortuum, appearing ſmooth and even, and a little removed from it.

Sublimate is a moſt violent corroſive, preſently corrupting and deſtroying all the parts of the body it touches. A ſolution of it in water, in the proportion of about a dram to a quart, is made uſe of for keeping down proud fleſh, and cleanſing foul ulcers; and a more dilute ſolution, as a coſmetic and for deſtroying cutaneous inſects. But a great deal of caution is requiſite even in theſe external uſes of it.

Some have nevertheleſs ventured to give it internally, in the doſe of one-tenth or one-eighth of a grain. Boerhaave relates, that if a grain of it be diſſolved

---

(A) Compound aquafortis is made by diſtilling a pound of the common ſort from a dram of ſea-ſalt.

ſolved in an ounce or more of water, and a dram of this ſolution, ſoftened with ſyrup of violets, taken twice or thrice a day, it will perform wonders in many reputed incurable diſtempers; but he particularly cautions us not to venture upon it, unleſs the method of managing it is well known.

Sublimate diſſolved in vinous ſpirits has of late been given internally in larger doſes; from a quarter of a grain to half a grain. This method of uſing it was brought into vogue by baron Van Swieten at Vienna, particularly for venereal maladies; and ſeveral trials of it have been made in this kingdom alſo with ſucceſs. Eight grains of the ſublimate are diſſolved in ſixteen ounces of rectified ſpirit of wine or proof-ſpirit; the rectified ſpirit diſſolves it more perfectly, and ſeems to make the medicine milder in its operation than the proof-ſpirit of the original preſcription of Van Swieten. Of this ſolution, from one to two ſpoonfuls, that is, from half an ounce to an ounce, are given twice a day, and continued till all the ſymptoms are removed; obſerving to uſe a low diet, with plentiful dilution, otherwiſe the ſublimate is apt to purge and gripe ſeverely. It generally purges more or leſs at the beginning, but afterwards ſeems to operate chiefly by urine and perſpiration.

Sublimate conſiſts of mercury united with a large quantity of marine acid. There are two general methods of deſtroying its corroſive quality, and rendering it mild; combining with it ſo much freſh mercury as the acid is capable of taking up, and ſeparating a part of the acid by means of alkaline ſalts, and the like. On the firſt principle, *dulcified mercury ſublimate* is formed; on the latter, *white precipitate*.

760. *Dulcified mercury ſublimate.*

Take of corroſive mercury ſublimate, one pound; purified quickſilver, nine ounces. Having powdered the ſublimate, add to it the quickſilver, and digeſt them together in a matraſs, with a gentle heat of ſand, until they unite; then, increaſing the heat, let the mixture be ſublimed. The ſublimed matter, freed from the acrimonious part at top and and ſuch mercurial globules as happen to appear diſtinct in it, is to be reduced into powder, and ſublimed again; and this ſublimation repeated ſix times. *L.*

Take of corroſive mercury ſublimate, reduced to powder in a glaſs mortar, four ounces and a half; pure quickſilver, three ounces. Mix them well together, by long trituration in a glaſs or marble mortar, untill the quickſilver ceaſes to appear; taking care to avoid the finer powder that flies off. Put the powder into an oblong phial, of ſuch a ſize, that only one-third of it may be filled; and ſet the glaſs in a ſand-furnace, ſo as that the ſand may reach up to one half of its height. By degrees of fire ſucceſſively applied, almoſt all the mercury will ſublime, and adhere to the upper part of the veſſel. The glaſs being then broken, and the red powder which is found in its bottom, with the whitiſh one that ſticks about the neck, being thrown away, let the white mercury be ſublimed again three or four times. *E.*

The trituration of corroſive ſublimate with quickſilver is a very noxious operation; for it is almoſt impoſſible, by any care, to prevent the lighter particles of the former from ariſing, ſo as to affect the operator's eyes and mouth. It is nevertheleſs of the utmoſt conſequence, that the ingredients be perfectly united before the ſublimation is begun; and this may be moſt commodiouſly effected by the digeſtion ordered by the firſt of the above proceſſes. It is indeed ſtill neceſſary to pulverize the ſublimate, before the mercury is added to it: but this may be ſafely performed, with a little caution; eſpecially if, during the pulverization, the matter be now and then ſprinkled with a little ſpirit of wine; this addition does not at all impede the union of the ingredients, or prejudice the ſublimation: it will be convenient not to cloſe the top of the ſubliming veſſel with a cap of paper at firſt (as is uſually practiſed) but to defer this till the mixture begins to ſublime, that the ſpirit may eſcape.

The rationale of this proceſs deſerves particular attention; and the more ſo, as a miſtaken theory herein has been productive of ſeveral errors with regard to the operation of mercurials in general. It is ſuppoſed, that the *dulcification*, as it is called, of the *mercurius corroſivus*, is owing to the ſpicula or ſharp points, on which its corroſiveneſs depends, being broken and worn off by the frequent ſublimations. If this opinion was juſt, the corroſive would become mild, without any addition, barely by repeating the ſublimation; but this is contrary to all experience. The abatement of the corroſive quality of the ſublimate is entirely owing to the combination of ſo much freſh mercury with it as is capable of being united; and by whatever means this combination is effected, the preparation will be ſufficiently dulcified. Triture and digeſtion promote the union of the two, whilſt ſublimation tends rather to diſunite them. The prudent operator, therefore, will not be ſolicitous about ſeparating ſuch mercurial globules as appear diſtinct after the firſt ſublimation; he will endeavour rather to combine them with the reſt, by repeating the triture and digeſtion.

The college of Wirtemberg require their mercurius dulcis to be only twice ſublimed, and the Auguſtan but once; and Neumann propoſes making it directly by a ſingle ſublimation, from the ingredients which the corroſive ſublimate is prepared from, by only taking the quickſilver in a larger proportion. If the medicine, made after either of theſe methods, ſhould prove in any degree acrid, water, boiled on it for ſome time, will diſſolve and ſeparate that part in which its acrimony conſiſts. The marks of the preparation being ſufficiently dulcified, are, its being perfectly inſipid to the taſte, and indiſſoluble by long boiling in water. Whether the water, in which it has been boiled, has taken up any part of it, may be known by dropping into the liquor a ley of any fixed alkaline ſalt, or any volatile alkaline ſpirit: if the decoction has any mercurial impregnation, it will grow turbid on this addition; if otherwiſe, it will continue limpid. But here care muſt be taken not to be deceived by an extraneous ſaline matter in the water itſelf: moſt of the common ſpring waters turn milky on the addition of alkalies; and therefore, for experiments of this kind, diſtilled water, or rain water, ought to be uſed.

Mercurius dulcis, ſeven times ſublimed, has been commonly called *calomelas*, and *aquila alba;* names which are now dropped both by the London and Edinburgh colleges. *Calomelas* is indeed a very improper appellation, the word implying a black colour: by grinding mercurius dulcis with volatile ſpirits, it becomes blackiſh; and this perhaps is the true calomel.

Mercurius dulcis appears to be one of the beſt and ſafeſt preparations of this mineral for general uſe, whether intended to act as a ſialogogue, diaphoretic, or alterant. Many of the more elaborate proceſſes are no other than attempts to produce from mercury ſuch a medicine as this really is. The doſe, for raiſing a ſalivation, is ten or fifteen grains, taken in the form of a bolus or pills, every night or oftener, till the ptyaliſm begins. As an alterant and diaphoretic, it is given in doſes of five or ſix grains; a purgative being occaſionally interpoſed, to prevent its affecting the mouth. It anſwers, however, much better when given in ſmaller quantities, as one, two, or three grains every morning and evening, in conjunction with ſuch ſubſtances as determine its action to the ſkin, as the extract or reſin of guaiacum; the patient at the ſame time keeping warm, and drinking liberally of warm diluent liquors. By this method of managing it, obſtinate cutaneous and venereal diſtempers have been ſucceſsfully cured, without any remarkable increaſe of the ſenſible evacuations.

761. *White precipitate of mercury.*

Diſſolve ſublimate corroſive mercury in a ſufficient quantity of hot water, and gradually drop into the ſolution ſome ſpirit of ſal ammoniac, as long as any precipitation enſues. Waſh the precipitated powder upon a filter, with ſeveral freſh quantities of warm water. *E.*

This preparation is uſed chiefly in ointments, in which intention its fine white colour is no ſmall recommendation to it.

Take ſublimate corroſive mercury, ſal ammoniac, of each equal weights. Diſſolve them both together in water; filter the ſolution, and precipitate it with a ſolution of any fixed alkaline ſalt. Waſh the precipitated powder till it is perfectly ſweet, (that is, inſipid or void of acrimony.) *L.*

Here the ſal ammoniac, beſides its uſe in the capital intention, that of furniſhing a volatile alkali to make a white precipitation, promotes the ſolution of the ſublimate; which of itſelf is difficultly and ſcarce at all totally ſoluble by repeated boiling in water: for however ſkilfully it is prepared, ſome part of it will have an under proportion of acid, and conſequently approach to the ſtate of mercurius dulcis. A good deal of care is requiſite in the precipitation; for, if too large a quantity of the fixed alkaline ſolution be imprudently added, the precipitate will loſe the elegant white colour for which it is valued.

A precipitate of a different nature from the preceding has been commonly diſtinguiſhed by the ſame name *mercurius præcipitatus albus.* But it is a preparation very rarely made uſe of among us; notwithſtanding the character given of it by Boerhaave, of being "perhaps the beſt remedy hitherto afforded by mercury." Mercury dulcis produces the good effects which this is ſuppoſed to do with a greater degree of certainty, and without diſordering the conſtitution, occaſioning vomiting, &c. which this precipitate, in a doſe of two or three grains, frequently does.

762. *The yellow mercurial emetic.* L.

Upon purified quickſilver, contained in a glaſs veſſel, pour double its weight of the ſtrong ſpirit or oil of vitriol. Heat the liquor by degrees, ſo as at length to make it boil, till a white maſs remains, which is to be thoroughly dried with a ſtrong fire. This maſs on the affuſion of warm water grows yellowiſh, and falls into powder, which is to be diligently ground with the water in a glaſs mortar: then ſuffer it to ſettle, pour off the water, and waſh the powder in ſeveral parcels of freſh water, until it is ſufficiently dulcified.

763. *Yellow precipitate of mercury, or turbith mineral.* E.

Take four ounces of pure quickſilver, and eight ounces of oil of vitriol. Cautiouſly mix them together; and diſtil, in a retort placed in a ſand-furnace, to dryneſs; the white calx which is left at the bottom being ground to powder, and thrown into warm water, immediately grows of a yellow colour: waſh this in freſh waters renewed ſeveral times, until it has loſt all its acrimony; then dry it for uſe.

Boerhaave directs this preparation to be made in an open glaſs ſlowly heated, and then placed immediately upon burning coals; care being taken to avoid the fumes, which are extremely noxious. This method will ſucceed very well with a little addreſs, when the ingredients are in ſmall quantity: but where the mixture is large, it is better to uſe a retort, placed in a ſand-furnace, with a recipient, containing a ſmall quantity of water, luted to it. Great care ſhould be taken, when the oil of vitriol begins to bubble, to ſteadily keep up the heat, without at all increaſing it, till the ebullition ceaſes, when the fire ſhould be augmented to the utmoſt degree, that as much as poſſible of the redundant acid may be expelled.

If the matter be but barely exſiccated, it proves a cauſtic ſalt, which in the ablution with water will almoſt diſſolve, leaving only a little quantity of turbith: the more of the acid has been diſſipated, the leſs of the remaining mercury will diſſolve, and conſequently the yield of turbith will be the greater; fire expelling only the acid, (*viz.* ſuch parts of the acid as are not completely ſatiated with mercury), while water takes up always along with the acid, a proportionable quantity of the mercury itſelf. Even when the matter has been ſtrongly calcined, a part will ſtill be ſoluble: this evidently appears upon pouring into the waſhings a little ſolution of fixed alkaline ſalt, which will throw down a conſiderable quantity of yellow precipitate, greatly reſembling the turbith, except that it is leſs violent in operation.

From this experiment it appears, that the beſt method of edulcorating this powder is, by impregnating the water intended to be uſed in its ablution, with a determined proportion of fixed alkaline ſalt; for by this means the waſhed turbith will not only turn out greater in quantity, but, what is of more conſequence, always have an equal degree of ſtrength; a circumſtance which deſerves particularly to be conſidered, eſpecially in making ſuch preparations as, from an error in the proceſs, may prove too violently corroſive to be uſed with any degree of ſafety.

Turbith mineral is a ſtrong emetic, and in this intention operates the moſt powerfully of all the mercurials that can be ſafely given internally. Its action however is not confined to the primæ viæ; it will ſometimes excite a ptyaliſm, if a purgative is not taken ſoon after it. This medicine is uſed chiefly in virulent gonorrhæas, and other venereal caſes where there is a great flux of humours to the parts: it is ſaid likewiſe to have been employed with good ſucceſs in robuſt conſtitutions, againſt leprous diſorders, and obſtinate glandular obſtructions: the doſe is from two grains to ſix or eight. It may be given in doſes of a grain or two as an alterative and diaphoretic, after the ſame manner as the red precipitate.

This medicine has been of late recommended as the moſt effectual preſervative againſt the hydrophobia. There are ſeveral examples of its preventing madneſs in dogs that had been bitten; and ſome, of its performing a cure after the madneſs was begun: from ſix or ſeven grains to a ſcruple may be given every day, or every other day, for a little time, and repeated at the two or three ſucceeding fulls and changes of the moon. Some few trials have likewiſe been made on human ſubjects bitten by mad dogs; and in theſe alſo the turbith, uſed either as an emetic or alterative, ſeemed in ſome caſes to have good effects. See MEDICINE, nº 425.

§ 8. PREPARATIONS of ANTIMONY.

764. ANTIMONY is compoſed of a metal united with ſulphur or common brimſtone.

If powdered antimony be expoſed to a gentle fire, the ſulphur exhales; the metallic part remaining in form of a white calx, reducible by proper fluxes into a whitiſh brittle metal, called *regulus*. This is readily diſtinguiſhed from the other bodies of that claſs, by its not being ſoluble in aquafortis; its proper menſtruum is aqua regis.

If aqua regis be poured upon crude antimony, the metallic part will be diſſolved, and the ſulphur thrown out, partly to the ſides of the veſſel, and partly to the ſurface of the liquor, in form of a greyiſh yellow ſubſtance. This, ſeparated and purified by ſublimation, appears on all trials the ſame with pure common brimſtone.

The metal, freed from the ſulphur naturally blended with it, and afterwards fuſed with common brimſtone, reſumes the appearance and qualities of crude antimony.

765. The antimonial metal is a medicine of the greateſt power of any known ſubſtance: a quantity too minute to be ſenſible on the tendereſt balance, is capable of producing virulent effects, if taken diſſolved or in a ſoluble ſtate. If given in ſuch a form as to be immediately miſcible with the animal fluids, it proves violently emetic; if ſo managed as to be more ſlowly acted on, cathartic; and in either caſe, if the doſe is extremely ſmall, diaphoretic. Thus, though vegetable acids extract ſo little from this metal, that the remainder ſeems to have loſt nothing of its weight, the tinctures prove in no large doſes ſtrongly emetic, and in ſmaller ones powerfully diaphoretic. The regulus has been caſt into the form of pills, which acted as virulent cathartics, though without ſuffering any ſenſible diminution of weight in their paſſage through the body; and this repeatedly, for a great number of times.

This metal, diveſted of the inflammable principle which it has in common with other metallic bodies, that is, reduced to a calx, becomes indiſſoluble and inactive. The calx nevertheleſs, urged with a ſtrong fire, melts into a glaſs, as eaſy of ſolution (partially), and as virulent in operation, as the regulus itſelf: the glaſs thoroughly mingled with ſuch ſubſtances as prevent its ſolubility, as wax, reſins, and the like, is again rendered mild.

766. Vegetable acids, as already obſerved, diſſolve but an extremely minute portion of this metal; the ſolution nevertheleſs proves powerfully emetic and cathartic. The nitrous and vitriolic acids only corrode it into a powder, to which they adhere ſo ſlightly as to be ſeparable in good meaſure by water, and totally by fire, leaving the regulus in form of a calx ſimilar to that prepared by fire alone. The marine acid has a very different effect: this reduces the regulus into a violent corroſive, and tho' it difficultly unites, yet very cloſely adheres to it, inſomuch as not to be ſeparable by any ablution, nor by fire, the regulus ariſing along with it. The nitrous or vitriolic acids expel the marine, and thus reduce the corroſive into a calx ſimilar to the foregoing.

767. Sulphur remarkably abates the power of this metal: and hence crude antimony (in which the regulus appears to be combined with from one-fourth to one half its weight of ſulphur) proves altogether mild. If a part of the ſulphur be taken away by ſuch operations as do not deſtroy or calcine the metal, the remaining maſs becomes proportionably more active.

The ſulphur of antimony may be expelled by deflagration with nitre: the larger the quantity of nitre, to a certain point, the more of the ſulphur will be diſſipated, and the preparation will be the more active. If the quantity of nitre is more than ſufficient to conſume the ſulphur, the reſt of it deflagrating with the inflammable principle of the regulus itſelf, renders it again mild.

The ſulphur of antimony is likewiſe abſorbed, in fuſion, by certain metals, and by alkaline ſalts. Theſe laſt, when united with ſulphur, prove a menſtruum for all the metals, (zinc excepted), and hence, if the fuſion is long continued, the regulus is taken up and rendered ſoluble in water.

768. *Crocus of antimony, commonly called* Crocus metallorum, *and by foreign writers* Hepar antimonii *or* liver of antimony.

Take antimony, nitre, of each equal weights. Reduce them ſeparately into powder; then mix, and inject them into a crucible heated to a white heat, that the mixture (after deflagration) may melt. Then pour it out, ſeparate the ſcoriæ, and reſerve the matter underneath them for uſe: it proves different in colour, according to the continuance of the heat: the longer it has been kept in fuſion, the yellower it will be. *L.*

The mixture of antimony and nitre, made as above,

is

Preparations.

is to be injected into a red-hot crucible; when the detonation is over, ſeparate the reddiſh metallic matter from the whitiſh cruſt, and edulcorate it by repeated waſhings with hot water. *E.*

Here the antimonial ſulphur is almoſt totally conſumed, and the metallic part left diveſted of its corrector. Theſe preparations, given from two to ſix grains, act as violent emetics, greatly diſordering the conſtitution. Their principal uſe is in maniacal caſes, as the baſis of ſome other preparations; and among the farriers, who frequently give to horſes an ounce or two a-day, divided into different doſes, as an alterative: in theſe and other quadrupeds, this medicine acts chiefly as a diaphoretic.

769. *Waſhed crocus of antimony.* L.

Reduce the crocus into a very ſubtile powder, and boil it in the water: then, throwing away this water, waſh the powder ſeveral times in freſh warm water, until it becomes perfectly inſipid.

This proceſs is deſigned chiefly to fit the crocus for the preparation of emetic tartar, of which hereafter, and of the antimonial emetic wine. If the crocus was employed for thoſe purpoſes without waſhing, the alkaline ſale, which it is in ſome degree impregnated with from the deflagration of the nitre, would in part ſatiate the acids of the tartar and of the wine, and thus, impeding their action on the metallic part of the antimony, render the medicines very precarious in ſtrength: that uncertainties of this kind may be the more effectually guarded againſt, the glaſs, or rather the pure regulus, of antimony, is by ſome preferred to the crocus, both for the emetic tartar and wine.

770. *Medicinal regulus of antimony.* E.

Take of antimony, five ounces; ſea-ſalt, four ounces; ſalt of tartar, one ounce. Grind them into powder; and throw the mixture, by little at a time, into a red-hot crucible; occaſionally breaking, with an iron rod, the cruſt that forms on the ſurface. When the fuſion is completed, pour out the matter into a heated cone, gently ſhaking it now and then, or ſtriking it on the ſides, that the regulus may ſettle to the bottom: when grown cold, beat off the ſcoriæ, and grind the regulus into a powder, which is to be kept in a cloſe-ſtopped vial.

This preparation is greatly celebrated by Hoffman, and other German phyſicians, in ſundry obſtinate chronical diſorders, and eſteemed one of the beſt antimonials that can be given with ſafety as alterants: it operates chiefly as a diaphoretic, and ſometimes, tho' rarely, emetic. The doſe is from three or four grains to 20.

This regulus, reduced into a ſubtle powder, is the genuine *febrifuge powder* of Craanius (*Pharm, Boruſſo Brandenburg*, edit. 1734. p. 107.), and has been greatly commended in all kinds of fevers both of the intermittent and continual kind (*Pharm. Argent.* 1725. p. 252.) It is ſaid that a doſe or two have frequently removed theſe diſorders, by occaſioning either a ſalutary diaphoreſis, or acting mildly by ſtool or vomit.

771. *Simple regulus of antimony.*

The moſt advantageous proceſs for obtaining this regulus appears to be the following.

Let powdered antimony be calcined or roaſted over a gentle fire, as directed hereafter for making the glaſs. Mix the calx with about equal its weight of ſome reducing flux, ſuch as the black flux. Melt the mixture in a crucible, with a quick fire, and when in thin fuſion pour it into a cone heated over a ſmoky flame: the pure regulus will fall to the bottom, the ſcoriæ floating on the top.

772. *Precipitated ſulphur of antimony.* L.

Take of antimony, 16 ounces; tartar, a pound; nitre, half a pound. Let theſe be reduced ſeparately into powder; then mixed, thrown by degrees into a red-hot crucible, and melted with a ſtrong fire. Pour out the matter into a conical mould; the metallic part, commonly called *regulus of antimony*, will ſink to the bottom, the ſcoriæ ſwimming about it. Diſſolve theſe ſcoriæ in water, filter the ſolution through paper, and precipitate the ſulphur by dropping in ſome ſpirit of ſea-ſalt: laſtly, waſh the ſulphur from the ſalts, and dry it for uſe.

773. *Golden ſulphur of antimony.* E.

Boil in an iron pot, four pints of ſoap-leys diluted with three pints of water, and throw in by degrees two pounds of powdered antimony; keeping them continually ſtirring, with an iron ſpatula, for three hours, over a gentle fire; and occaſionally ſupplying more water. The liquor, loaded with the ſulphur of antimony, being then ſtrained through a double linen cloth, drop into it gradually, whilſt it continues hot, ſo much ſpirit of nitre, diluted with an equal quantity of water, as ſhall be ſufficient to precipitate the ſulphur, which is afterwards to be carefully waſhed with hot water.

The foregoing preparations prove emetic when taken on an empty ſtomach, in a doſe of four, five, or ſix grains: but in the preſent practice, they are ſcarce ever preſcribed in this intention; being chiefly uſed as alterative deobſtruents, particularly in cutaneous diſorders. Their emetic quality is eaſily blunted, by making them up into pills with reſins or extracts, and giving them on a full ſtomach: with theſe cautions, they have been increaſed to the rate of 16 grains a-day, and continued for a conſiderable time, without occaſioning any diſturbance upwards or downwards. As their ſtrength is precarious, they ſhould be taken at firſt in very ſmall doſes, and increaſed by degrees according to their effect.

A compoſition of the golden ſulphur with *mercurius dulcis*, has been a powerful, yet ſafe, alterative in cutaneous diſorders; and has completed a cure after ſalivation had failed; in venereal caſes likewiſe, this medicine has produced excellent effects. A mixture of equal parts of the ſulphur and calomel (well triturated together, and made into pills with extracts, &c.) may be taken from four to eight or ten grains, morning and night; the patient keeping moderately warm, and drinking after each doſe a draught of a decoction of the woods or other like liquors. This medicine generally promotes perſpiration, ſcarce occaſioning any tendency to vomit or purge, or affecting the mouth. See the *Edinburgh eſſays*, vol. i. and the *Acta natur. curioſ.* vol. v.

773—789. *Kermes mineral.* See KERMES (*Mineral*), in the order of the alphabet.

790. *Panacea of antimony.*

Take of antimony, ſix ounces; nitre, two ounces; common ſalt, an ounce and a half; charcoal, an ounce. Reduce them into a fine powder, and put the mixture into a red-hot crucible, by half a ſpoonful at a time, continuing the fire a quarter of an hour after the laſt injection: then either pour the matter into a cone, or let it cool in the crucible, which when cold muſt be broken to get it out. In the bottom will be found a quantity of regulus; above this a compact liver-coloured ſubſtance; and on the top, a more ſpongy maſs: this laſt is to be reduced into powder, edulcorated with water, and dried, when it appears of a fine golden colour.

This preparation is ſuppoſed to have been the baſis of *Lockyer's pills*, which were formerly a celebrated purge. Ten grains of the powder mixed with an ounce of white ſugar-candy, and made up into a maſs with mucilage of gum tragacanth, may be divided into an hundred ſmall pills; of which one, two, or three, taken at a time, are ſaid to work gently by ſtool and vomit.

791. *Glaſs of antimony.* E.

Take of antimony reduced to powder, one pound. Calcine it over a gentle fire, in an unglazed earthen veſſel, keeping it continually ſtirring with an iron ſpatula, until the fumes ceaſe, even when the matter is red-hot. Melt the calx in a crucible, with an intenſe fire, and pour out the liquid matter into a heated braſs diſh.

The calcination of antimony, to fit it for making a tranſparent glaſs, ſucceeds very ſlowly, unleſs the operator be very wary and circumſpect in the management of it. The moſt convenient veſſel is a broad ſhallow diſh, or a ſmooth flat tile, placed under a chimney. The antimony ſhould be of the purer ſort, ſuch as is uſually found at the apex of the cones: this, groſsly powdered, is to be evenly ſpread over the bottom of the pan, ſo as not to lie above a quarter of an inch thick on any part. The fire ſhould be at firſt no greater than is juſt ſufficient to raiſe a fume from the antimony, which is to be now and then ſtirred: when the fumes begin to decay, increaſe the heat, taking care not to raiſe it ſo high as to melt the antimony, or run the powder into lumps: after ſome time the veſſel may be made red-hot, and kept in this ſtate until the matter will not, upon being ſtirred, any longer fume. If this part of the proceſs be duly conducted, the antimony will appear in an uniform powder, without any lumps, and of a grey colour.

With this powder, fill two-thirds of a crucible, which is to be covered with a tile, and placed in a wind-furnace. Gradually increaſe the fire, till the calx is in perfect fuſion, when it is to be now and then examined by dipping a clean iron wire into it: if the matter, which adheres to the end of the wire, appears ſmooth and equally tranſparent, the vitrification is completed, and the glaſs may be poured out upon a hot ſmooth ſtone or copper plate, and ſuffered to cool by ſlow degrees to prevent its cracking and flying in pieces. It is of a tranſparent yellowiſh-red colour.

The calcined antimony is ſaid by Boerhaave to be violently emetic. Experience has ſhown that the glaſs is ſo, inſomuch as to be unſafe for internal uſe. It is employed chiefly, in the preſent practice, as being ſubſervient to ſome other preparations, particularly the emetic tartar and antimonial wine; and in combination with wax, and ſome other ſubſtances, by which its power is obtunded.

792. *Cerated glaſs of antimony.* E.

Take of yellow wax, a dram; glaſs of antimony, reduced into powder, an ounce. Melt the wax in an iron veſſel, and throw into it the powdered glaſs: keep the mixture over a gentle fire for half an hour, continually ſtirring it; then pour it out upon a paper, and when cold grind it into powder.

The glaſs melts in the wax, with a very ſoft heat: after it has been about 20 minutes on the fire, it begins to change its colour, and in 10 more comes near to that of Scotch ſnuff, which is a mark of its being ſufficiently prepared: the quantity ſet down above, loſes about one dram of its weight in the proceſs.

This medicine has for ſome time been greatly eſteemed in dyſenteries: ſeveral inſtances of its good effects in theſe caſes may be ſeen in the fifth volume of the Edinburgh eſſays, from which the above remarks on the preparation are taken. The doſe is from two or three grains to twenty, according to the age and ſtrength of the patient. In its operation, it makes ſome perſons ſick and vomit; it purges almoſt every one; though it has ſometimes effected a cure without occaſioning any evacuation or ſickneſs.

793. *The antimonial cauſtic.* L. E.

Take of crude antimony, one pound; corroſive mercury ſublimate, two pounds. Reduce them ſeparately into powder; then mix, and diſtil them in a wide-necked retort, with a gentle ſand-heat. The matter which ariſes into the neck of the retort is to be expoſed to the air, that it may run into a liquor.

This is intended for conſuming fungous fleſh and the callous lips of ulcers.

794. *Cinnabar of antimony.*

Is compoſed of the ſulphur of the antimony, and the mercury of the ſublimate, which are perfectly the ſame with the common brimſtone and quickſilver, of which the artificial cinnabar is made. The antimonial cinnabar therefore, whoſe ingredients are laboriouſly extracted from other ſubſtances, is not different from the common cinnabar made with the ſame materials procured at a much cheaper rate.

795. *Emetic tartar.*

Take of waſhed crocus of antimony, cryſtals of tartar, each half a pound; water, three pints. Boil them together for half an hour; then filter the liquor, and after due evaporation ſet it by to cryſtalliſe. L.

Take of powdered cream of tartar, four ounces; levigated glaſs of antimony, ſix ounces. Mix, and throw them by little and little into a gallon of water boiling in a glaſs veſſel ſet in a ſand-heat. Let the whole boil gently for ſix hours; conſtantly ſupplying the water conſumed by evaporation; then let the liquor be ſtrained when cold, and evaporated to a proper pitch that cryſtals may be formed. Tartar emetic may be made after the ſame manner from crocus metallorum, provided this has been properly prepared, which is known by its being of a yellow colour when powdered. *E.*

The title of this medicine expreſſes its principal operation. It is one of the beſt of the antimonial emetics, acting more powerfully than the quantity of crocus contained in it would do by itſelf, though it does not ſo much ruffle the conſtitution.

The doſe of emetic tartar, when deſigned to produce the full effect of an emetic, is from four to ſix or eight grains. It may likewiſe be advantageouſly given in ſmaller doſes, half a grain, for inſtance, as a diaphoretic and alterative in cutaneous diſorders; and added in the quantity of a grain as a ſtimulus to ipecacuanha, &c.

§ 9. PREPARATIONS of BISMUTH.

796. THIS metal reſembles in appearance the regulus of antimony, but differs greatly from it in its pharmaceutical properties and medical qualities. It melts in a very ſmall heat long before ignition; and totally diſſolves, with great efferveſcence, in aquafortis, which only corrodes the antimonial metal. As a medicine, it ſeems, when pure, to have little or no effect; though ſome preparations of it were formerly accounted diaphoretic. At preſent only one preparation comes under the notice of the apothecary or chemiſt, and that deſigned for external uſe.

797. *Magiſtery of biſmuth.*

Diſſolve biſmuth in a proper quantity of aquafortis, without heat, adding the biſmuth by little and little at a time. Pour the ſolution into ſixteen times its quantity of fair water: it will grow milky, and on ſtanding for ſome time, depoſit a bright white precipitate: the addition of ſpirit of wine will expedite the precipitation. Waſh the powder in freſh parcels of water, and dry it in a ſhady place betwixt two papers.

This preparation is of ſome eſteem as a coſmetic, which is the only uſe it is now applied to.

§ 10. PREPARATIONS of ZINC.

798. THIS metal melts in a red heat; and, if the air is admitted, flames, and ſublimes into light, white, downy flowers: if the air is excluded, it ariſes by a ſtrong fire in its metallic form. Sulphur, which unites with or ſcorifies all the other metals except gold, does not act on zinc. Acids of every kind diſſolve it.

Zinc, its flowers or calces, and ſolutions, taken internally, prove ſtrong and quick emetics; in ſmall doſes, they are ſaid to be diaphoretic. Externally, they are cooling, aſtringent, and deſiccative.

799. *Purification of zinc.*

Melt zinc with a heat no greater than is juſt ſufficient to keep it fluid. Stir it ſtrongly with an iron rod; and throw in alternately pieces of ſulphur and of tallow, the firſt in largeſt quantity. If any conſiſtent matter or ſcoria forms on the top, take it off, and continue the proceſs until the ſulphur is found to burn freely and totally away on the ſurface of the fluid zinc.

Zinc uſually contains a portion of lead, which this proceſs effectually ſeparates. Sulphur united with lead forms a maſs, which does not melt in any degree of fire that zinc is capable of ſuſtaining.

800. *Flowers of zinc.*

Let a large and very deep crucible, or other deep earthen veſſel, be placed in a furnace, in an inclined ſituation, only half upright. Put a ſmall quantity of zinc into the bottom of the veſſel, and apply a moderate fire, no greater than is neceſſary to make the zinc flame; white flowers will ariſe, and adhere about the ſides of the veſſel like wool. When the zinc ceaſes to flame, ſtir it with an iron rod, and continue this operation till the whole is ſublimed.

Theſe flowers ſhould ſeem preferable for medicinal purpoſes, to tutty, and the more impure ſublimates of zinc which are obtained in the braſs-works; and likewiſe to calamine, the natural ore of this metal, which contains a large quantity of earth, and frequently a portion of heterogeneous metallic matter.

801. *Salt or vitriol of zinc.*

Diſſolve purified zinc by a gentle heat of ſand in a mixture of one part of oil of vitriol and four of water. Filter the ſolution; and after due evaporation, ſet it to cryſtallize.

This ſalt is an elegant white vitriol. It differs from the common white vitriol and the *ſal vitrioli* of the ſhops, only in being purer, and perfectly free from any admixture of copper, or ſuch other foreign metallic bodies as the others generally contain.

§ 11. COMPOUND METALLIC PREPARATIONS.

802. *The medicinal ſtone.*

Take of litharge, bole armenic, or French bole, alum, each half a pound; colcothar of green vitriol, three ounces; vinegar, a quarter of a pint. Mix and dry them till they grow hard.

This preparation is employed externally as an aſtringent for faſtening looſe teeth, preſerving the gums, healing and drying up ulcers and wounds, and repreſſing defluxions of thin acrid humours upon the eyes. It is ſometimes uſed in injections for checking a gonorrhœa, after the virulence is expelled.

803. *An aſtringent preparation taken from Maetz, which has been ſold under the name of* Colbatch's ſtyptic powder.

Take any quantity of iron-filings, and as much ſpirit of ſalt as will riſe above them three or four inches. Digeſt them together with a gentle heat till the ſpirit ceaſes to act on the metal; then pour off the liquor, evaporate it to one half, and add thereto an equal weight of ſugar of lead. Continue the evaporation with a ſmall heat, until the matter remains dry, and aſſumes a red colour. If the proceſs is ſtopped as ſoon as it becomes dry, it has exactly the appearance of Colbatch's powder. It muſt be kept cloſe from the air, otherwiſe it deliquiates.

This is ſaid to be the ſtyptic with which ſo much noiſe was made ſome time ago, by the author of the *Novum lumen chirurgiæ*, and for the ſale of which a patent was procured: only in that was uſed oil of vitriol, inſtead of the ſpirit of ſalt in this; a difference not very material. The preparation ſtands recommended in all kinds of hæmorrhages and immoderate fluxes, both internally and externally: the doſe is from four grains to twelve. It is undoubtedly an efficacious ſtyptic, but for internal uſe a dangerous one.

804. *Antimonial ethiops.*

Let equal quantities of antimony and ſea-ſalt be melted together in a crucible for an hour: when grown cold, a regulus (improperly ſo called) will be found in the bottom; which is to be ſeparated from the ſcoriæ that lie above it, and ground with an equal weight of purified quickſilver until they are united.

This medicine is ſaid to be of remarkable efficacy in venereal caſes of long ſtanding, in cancerous tumours, ſcorbutic and ſcrophulous diſorders, obſtinate glandular obſtructions, and ſundry other chronical diſtempers which elude the force of the common medicines. A few grains may be given at firſt, and the doſe gradually increaſed, according to its operation, to a ſcruple or more. It acts chiefly by promoting perſpiration: in ſome conſtitutions it proves purgative; and in others, if the doſe is conſiderable, emetic.

CHAP. II.

Medicinal COMPOSITIONS.

SECT. I. *Powders.*

805. THIS form receives ſuch materials only as are capable of being ſufficiently dried to become pulverable, without the loſs of their virtue. There are many ſubſtances, however, of this kind, which cannot be conveniently taken in powder: bitter, acrid, fetid drugs, are too diſagreeable: emollient and mucilaginous herbs and roots are too bulky; pure gums cohere, and become tenacious in the mouth; fixed alkaline ſalts liquefy upon expoſing the compoſition to the air; and volatile alkalies exhale.

The doſe of powders, in extemporaneous preſcription, is generally about half a dram; it rarely exceeds a whole dram, and is not often leſs than a ſcruple. Subſtances which produce powerful effects in ſmaller doſes are not truſted to this form, unleſs their bulk is increaſed by additions of leſs efficacy: thoſe which require to be given in larger ones, are better fitted for other forms.

The uſual vehicle for taking the lighter powders in, is any agreeable thin liquid. The ponderous powders, particularly thoſe prepared from metallic ſubſtances, require a more conſiſtent vehicle, as ſyrups; for from thin ones they ſoon ſubſide. Reſinous ſubſtances likewiſe are moſt commodiouſly taken in thick liquors: in thin ones, they are apt to run into lumps, which are not eaſily again diſſoluble.

806. *General rules for making powders.*

I. Particular care ought to be taken that nothing carious, decayed, or impure, be mixed in the compoſition of powders: the ſtalks and corrupted parts of plants are to be ſeparated.

II. The dry aromatics ought to be ſprinkled, during their pulverization, with a few drops of any proper water.

III. The moiſter aromatics may be dried with a very gentle heat before they are committed to the mortar.

IV. Gums, and ſuch other ſubſtances as are difficultly pulverable, ſhould be pounded along with the drier ones, that they may paſs the ſieve together.

V. No part ſhould be ſeparated for uſe until the whole quantity put into the mortar has paſſed the ſieve, and the ſeveral ſiftings been mixed together; for thoſe parts of one and the ſame ſubject which powder firſt, may prove different, at leaſt in degree of efficacy, from the reſt.

VI. Powders of aromatics are to be prepared only in ſmall quantities at a time, and kept in glaſs veſſels very cloſely ſtopped.

If powders are long kept, and not carefully ſecured from the air, their virtue is in great meaſure deſtroyed, although the parts in which it conſiſts ſhould not in other circumſtances prove volatile. Thus, though the virtues of ipecacoanha are ſo fixed as to remain entire even in extracts made with proper menſtrua, yet if the powdered root be expoſed for a length of time to the air, it loſes its emetic quality.

807. *Pulvis Antilyſſus*, or *Powder againſt the bite of a mad dog.* L. E.

Take of aſh-coloured ground-liverwort, two ounces; black pepper, one ounce. Beat them together into a powder.

The virtue which this medicine has been celebrated for, is expreſſed in its title: the doſe is a dram and a half, to be taken in the morning faſting in half a pint of cows milk warm, for four mornings together.

808. *Compound powder of arum.* L.

Take of arum-root, freſh dried, two ounces; yellow water-flag roots, burnet ſaxifrage-roots, each one ounce; crabs-eyes prepared, cinnamon, each half an ounce; ſalt of wormwood, two drams. Beat them into a powder, which is to be kept in a cloſe veſſel.

The compound powder of arum was originally intended as a ſtomachic; and in weakneſſes and relaxations of the ſtomach, accompanied with a ſurcharge of viſcid humours, it is doubtleſs a very uſeful medicine. It frequently alſo has good effects in rheumatic caſes. The doſe may be from a ſcruple to a dram, two or three times a-day, in any convenient liquor. It ſhould be uſed as freſh as poſſible, for its virtue ſuffers greatly in keeping.

809. *Compound powder of bole without opium.*

Take of bole armenic, or French bole, half a pound; cinnamon, four ounces; tormentil root, gum arabic, each three ounces; long pepper, half an ounce. Reduce theſe ingredients into powder.

810. *Compound powder of bole with opium.* L.

Take of opium ſtrained, three drams. Dry it a little, ſo as to render it eaſily pulverable; and add it to the foregoing ſpecies, that they may all beat into a powder together.

This powder with opium is an elegant reform of the ſpecies of Fracaſtorius's confection, commonly called *diaſcordium*; conſiſting only of ſuch of the ingredients of that compoſition as are moſt conducive to the intention for which it is at preſent preſcribed. Forty-five grains of the powder contain one of opium.

The powder is directed to be kept in the ſhops without opium, for caſes where the aſſiſtance of that drug is not wanted. It is a warm glutinous aſtringent; and is given in fluxes, or other diſorders where medicines of this claſs are proper, in doſes of a ſcruple or half a dram.

811. *Compound powder of ceruſſe.* L.

Take of ceruſſe, five ounces; ſarcocolla, an ounce and a half; gum tragacanth, half an ounce. Beat them together into a powder.

This compoſition is the *trochiſci albi* of Razi, brought back to its original ſimplicity with regard to the ingredients, and without the needleſs trouble of making it into troches. It is employed for external purpoſes, as in collyria, lotions, and injections, for repelling acrimonious humours, and in inflammations.

812. *Compound powder of crabs-claws.* L.

Take of the tips of crabs-claws prepared, one pound; pearls prepared, red coral prepared, each three ounces. Mix them together.

813. *Compound teſtaceous powder.*

Take of oyſter-ſhells prepared, one pound; white chalk, half a pound. Mix them together.

This cheap abſorbent powder is at leaſt equally valuable as a medicine with the more coſtly and compounded crabs-claw and bezoardic powders of the ſhops. Theſe kinds of preparations are given from half a ſcruple to half a dram, for abſorbing or deſtroying acidities in the firſt paſſages; which ſeems to be the only good effect that can be reaſonably expected from theſe ſimple antacid earths. If they meet with no acid to diſſolve them, they promiſe to be injurious rather than beneficial.

It may here be proper to take notice of a quality hitherto little expected from theſe kind of ſubſtances, that of ſtrongly promoting putrefaction. Fleſh mixed with a ſmall proportion of chalk, and expoſed to a heat equal to that of the human body, not only corrupts ſooner than without this addition, but likewiſe in a far greater degree, reſolving in a few days into a perfect mucus. This quality of the abſorbent powders (for the diſcovery of which, with many other curious experiments on the ſame ſubject, the public are obliged to Dr Pringle) ſeems to forbid their uſe in all thoſe kinds of fevers where the animal-juices are already too much diſpoſed to a putrefactive ſtate. Indeed, in fevers of any kind, though frequently employed, they are at beſt unſerviceable; and perhaps their ill effects would be oftener ſeen, if it was not for the quantity of acids uſually given in acute diſeaſes.

814. *Bezoardic powder.* L.

Take of compound powder of crabs-claws, one pound; Oriental bezoar prepared, one ounce. Mix them together.

Bezoar has hitherto been an ingredient in the foregoing compoſition, which was then called *Gaſcoign's powder*; though, notwithſtanding the addition which this article made to the price, it added nothing to the virtue of the medicine. The college of London have therefore very prudently directed an abſorbent powder without this coſtly article; and compoſed another, diſtinguiſhed by its name, for the uſe of thoſe who expect any particular virtues from it.

815, a. *Compound powder of contrayerva.*

Take of compound powder of crabs-claws, a pound and a half; contrayerva root, five ounces. Make them into a powder. L.

Take of contrayerva root, ſix drams; Virginian ſnake-root, two drams; Engliſh ſaffron, one dram; compound powder of crabs-claws, two ounces. Make them into a powder. *E.*

Theſe medicines have a much better claim to the title of an alexipharmic and ſudorific than the two foregoing compoſitions. The contrayerva, ſnakeroot, and ſaffron, by themſelves are ſuch, and prove very ſerviceable in low fevers, where the vis vitæ is weak, and a diaphoreſis to be promoted. It is poſſible that the crabs-claw powders are of no farther ſervice than as they divide thoſe powerful ingredients, and render them ſupportable to the ſtomach.

815, b. *Powder of chalk.* E.

Take of white chalk prepared, four ounces; nutmegs and cloves, of each half a dram. Mix them together into a powder, which ſupplies the place of the troches againſt the heartburn.

816. *Epileptic powder.*

Take wild valerian root, peony root, of each equal parts. Make them into a powder.

This powder may be looked on as a medicine of ſome importance for the purpoſes expreſſed in its title, far ſuperior to thoſe of ſimilar intention in other pharmacopœias. The doſe is from ten grains to half a dram for children, and from half a dram to two drams for adults.

817. *Compound powder of myrrh.* L.

Take of rue leaves dried, dittany of Crete, myrrh, each an ounce and a half; aſafetida, ſagapenum, Ruſſia caſtor, opopanax, each one ounce. Beat them together into a powder.

This is a reformation of the troches of myrrh, a compoſition contrived by Razi againſt uterine obſtructions. It may be taken in any convenient vehicle, or made into boluſes, from a ſcruple to a dram or more two or three times a day.

818. *Powder to promote delivery.*

Take of borax, half an ounce; caſtor, ſaffron, each a dram and a half; oil of cinnamon, eight drops; oil of amber, ſix drops. Beat the ſpecies together into a powder, to which add the oils, and mix the whole well together.

This medicine has long been held in eſteem for the purpoſe expreſſed in its title; nevertheleſs, its real efficacy, and what ſhare thereof is owing to each of the ingredients, has not been ſufficiently determined: the borax, though by ſome thought to be of little importance, does not perhaps contribute leaſt to its virtue.

tue. The doſe is from a ſcruple to a dram, or ſo much as can be conveniently taken up at once on the point of a knife. It ſhould be kept in a very cloſe veſſel, otherwiſe it will ſoon loſe a conſiderable deal of its more valuable parts.

819. *Compound powder of ſcammony.*

Take of ſcammony, four ounces; calcined hartſhorn prepared, three ounces. Grind them diligently together into a powder. *L.*

Take of ſcammony, cryſtals of tartar, of each two ounces; mix and rub them together into a very fine powder. *E.*

Here the ſcammony is divided by the earthy calx and ſalt, and thus rendered ſomewhat more ſoluble, and leſs adheſive; hence its purgative quality is promoted, at the ſame time that it becomes leſs griping. The doſe of the compound is from fifteen grains to half a dram.

820. *Compound powder of ſena.* L.

Take of cryſtals of tartar, ſena, each two ounces; ſcammony, half an ounce; cloves, cinnamon, ginger, each two drams. Powder the ſcammony by itſelf, and all the other ingredients together; then mix them.

This powder is given as a cathartic, in the doſe of two ſcruples or a dram. The ſpices are added, not only to divide, but to warm the medicine, and make it ſit eaſier on the ſtomach. The ſcammony is uſed as a ſtimulus to the ſena; the quantity of the latter neceſſary for a doſe, when not aſſiſted by ſome more powerful material, being too bulky to be conveniently taken in this form.

821. *Sternutatory powder.* L.

Take of aſarum, marjoram, marum-ſyriacum leaves dried, lavender flowers dried, each equal weights. Rub them together into a powder.

822. *Cephalic powder.* E.

Take of the leaves of aſarum, three parts; of marjoram, one part. Beat them together into a powder.

The titles of theſe powders ſufficiently expreſs their intention. They are both agreeable and efficacious errhines, and ſuperior to moſt of thoſe uſually ſold under the name of *herb-ſnuff*.

823. *Styptic powder.* E.

Take of alum, an ounce and a half; gum kino, three drams. Make them into a powder.

This powder is a very powerful aſtringent.

824. *Compound powder of amber.* L.

Take of amber prepared, gum arabic, each ten drams; juice of hypociſtis, balauſtines, Japan earth, each five drams; olibanum, half an ounce; ſtrained opium, one dram. Beat them together into a powder.

This medicine may be looked upon as an uſeful, and tolerably elegant aſtringent; though poſſibly the ingredient which it receives its name from, contributes little to its virtue. Two ſcruples of the compoſition contain one grain of opium.

825. *Compound powder of gum tragacanth.* L.

Take of gum tragacanth, gum arabic, marſhmallow root, each an ounce and a half; ſtarch, liquorice, each half an ounce; double-refined ſugar, three ounces. Grind them into a powder.

This powder is a mild emollient; and hence becomes ſerviceable in hectic caſes, tickling coughs, ſtrangury, ſome kinds of alvine fluxes, and other diſorders proceeding from a thin acrimonious ſtate of the humours, or an abraſion of the mucus of the inteſtines: it ſoftens and gives a greater degree of conſiſtency to the former, and defends the latter from being irritated or excoriated by them. The doſe is from half a dram to two or three drams, which may be frequently repeated.

826. *Hiera picra.*

Take of gum extracted from ſocotorine aloes, one pound; canella alba, three ounces. Beat them ſepparately into powder, and then mix them together. *L.*

Take ſocotorine aloes, four ounces; Virginian ſnakeroot, ginger, each half an ounce. Mix, and beat them into a powder. *E.*

Theſe compoſitions were originally directed to be made into an electuary: with us, they have been rarely uſed in that form, and not often in this of a powder, on account of their great nauſeouſneſs. They are chiefly employed as the baſis of a tincture called *tinctura ſacra*. See n° 376.

827, a. *Aromatic ſpecies.* L.

Take of cinnamon, two ounces; leſſer cardamom ſeed huſked, ginger, long pepper, each one ounce. Beat them together into a powder.

827, b. *Aromatic powder.* E.

Take of nutmegs, leſſer cardamon ſeeds, ginger, each two ounces. Beat them together into a powder, to be kept in glaſs veſſels well ſtopped.

Both theſe compoſitions are agreeable, hot, ſpicy medicines; and as ſuch may be uſefully taken in cold phlegmatic habits and decayed conſtitutions, for warming the ſtomach, promoting digeſtion, and ſtrengthening the tone of the viſcera. The doſe is from ten grains to a ſcruple and upwards. The firſt is conſiderably the warmeſt.

828. *Species of ſcordium without opium.* L.

Take of bole armenic, or French bole, four ounces; ſcordium, two ounces; cinnamon, an ounce and a half; ſtorax ſtrained, tormentil root, biſtort root, gentian, dittany of Crete, galbanum ſtrained, gum arabic, red roſes, each one ounce; long pepper, ginger, each half an ounce. Reduce them into powder.

829. *Species of ſcordium with opium.* L.

Take of ſtrained opium, three drams. Dry it a little, that it may eaſily pulverize; and add it to the foregoing ſpecies in the beating, that they may be all reduced into a powder together.

This is the ſpecies of *Fracaſtorius's confection*, or *diaſcordium*, which has been hitherto kept in the ſhops in the form of an electuary only, but is now judiciouſly directed in that of a powder alſo, both with and without the opium: when made into an electuary, the medicine, in keeping, loſes of its aſtringency, in which conſiſts great part of its virtue. As this compoſition has in common practice been looked upon as a medicine of great conſequence, and its effects determined by long experience; the college have made no farther alteration in its ingredients, than ſubſtituting red roſes themſelves to the ſugar of roſes, omitting ſorrel ſeeds, which are certainly inſignificant, and ſupplying the Lemnian earth, which with us is ſcarce ever met with genuine, by a proper increaſe of the bole.

830. *Saline cathartic powder.*

Take of vitriolated tartar, cryſtals of tartar, each one dram; ſal prunel, or purified nitre, one ſcruple. Make them into a powder.

This is an uſeful cathartic in inflammatory diſorders and a viſcid impure ſtate of the juices. The quantity above directed is intended for one doſe, which ſhould be accompanied with plentiful dilution.

831. *Carminative powder.*

Take of aniſeed, ſweet-fennel ſeed, each two ſcruples; ginger, one ſcruple; nutmegs, half a ſcruple; fine ſugar, half a dram. Reduce them into a powder, for four doſes.

This powder is employed for expelling flatulencies ariſing from indigeſtion, particularly thoſe to which hypochondriacal and hyſterical perſons are ſubject. It is likewiſe uſefully given in the gripes of young children, either mixed with their food or otherwiſe.

832. *Diuretic powder.*

Take of ſal prunel, ten grains; ſalt of amber, four grains; oil of turpentine, three drops; fine ſugar, one ſcruple. Drop the oil upon the ſugar, then add the ſalts, and grind the whole together.

This powder is a very efficacious diuretic, and may be given to advantage in caſes where the aſſiſtance of ſuch forcing medicines is required. The ſalts ſomewhat abate the heating quality of the oil, and at the ſame time cool and relax the paſſages.

833. *Strengthening powder.*

Take of extract of Peruvian bark, 12 grains; ſalt of ſteel, two grains; oil of cinnamon, one drop; fine ſugar, half a dram. Having mixed the oil with the ſugar, add the other ingredients, and grind the whole well together for two doſes.

This medicine has a much better title to the appellation of a *ſtrengthener*, than thoſe uſually met with under that name in diſpenſatories. In lax habits, debilities of the nervous ſyſtem, the weakneſſes peculiar to either ſex, it has generally good effects.

834. *Powder againſt the king's evil.*

Take of burnt ſponge, one ſcruple; nitre, coralline, fine ſugar, each half a ſcruple. Reduce them into powder.

This powder is recommended in ſcrophulous diſorders and obſtructions of the glands: it is ſuppoſed to open and deterge the minute veſſels, and carry off the offending matter by urine. Dr Mead informs us, in his *Monita Medica*, that he very frequently experienced its good effects; he uſed to give the quantity above preſcribed, twice a day, with three or four glaſſes of the leſs compounded lime-water along with each doſe: if the patient was much emaciated, the lime-water was mixed with about an equal quantity of milk.

835. *Vermifuge powder.*

1. Take of tanſy flowers, worm-ſeed, each three drams; ſalt of ſteel, one dram. Make them into a powder.
2. Take of tin reduced into fine powder, two drams; ethiops mineral, half a dram; fine ſugar, one ſcruple. Mix them well together.
3. Take of choice rhubarb, three drams; ſcammony, calomel, each one dram. Mix, and make them into a powder.

All theſe compoſitions are well calculated for the purpoſe expreſſed in the title. The firſt is given in hoſpitals, in doſes of half a dram twice a day; which quantity contains about four grains and a half of the ſalt of ſteel. The ſecond is divided into three or four doſes, one of which is taken every morning, and a cathartic on the day following. The third, which is a briſk purgative, is uſed in the quantity of half a dram, after the others have been premiſed; or it is taken once or twice a week without their aſſiſtance.

836. *Compound powder of jalap.* E.

Take of jalap root, one ounce; cryſtals of tartar, two ounces. Mix, and rub them together into a very fine powder. *E.*

837. *Dover's ſweating powder.*

Take of vitriolated tartar, four ounces and an half; opium, powdered ipecacuanha root, of each half an ounce. Mix, and rub them well together into a fine powder.

SECT. II. *Troches and Lozenges.*

836. TROCHES and lozenges are compoſed of powders made up with glutinous ſubſtances into little cakes, and afterwards dried. This form is principally made uſe of for the more commodious exhibition of certain medicines, by fitting them to diſſolve ſlowly in the mouth, ſo as to paſs by degrees into the ſtomach; and hence theſe preparations have generally a conſiderable proportion of ſugar or other materials grateful to the palate. Some powders have likewiſe been reduced into troches, with a view to their preſervation; though poſſibly for no very good reaſons: for the moiſtening, and afterwards drying them in the air, muſt in this light be of greater injury than any advantage accruing from this form can counterbalance.

General rules for making troches.

I. The three firſt rules laid down for making powders, are alſo to be obſerved in the powders for troches.

II. If the maſs proves ſo glutinous as to ſtick to the fingers in making up, the hands may be anointed with any convenient ſweet or aromatic oil; or elſe ſprinkled with powder of ſtarch, or with that of liquorice.

III. In order to thoroughly dry the troches, put them on an inverted ſieve, in a ſhady, airy place, and frequently turn them.

IV. Troches are to kept in glaſs veſſels, or in earthen ones well glazed.

838, a. *White pectoral troches.*

Take of double-refined ſugar, a pound and a half; ſtarch, an ounce and a half; liquorice, ſix drams; Florence orris root, half an ounce. Reduce theſe ingredients into powder, which is to be made up into troches with a proper quantity of mucilage of gum tragacanth. *L.*

Take of white ſugar, one pound; gum arabic, two ounces; ſtarch, one ounce; Florentine orrice root, one ounces. Make them into troches with roſe-water. *E.*

Theſe compoſitions are very agreeable pectorals, and may be uſed at pleaſure. They are calculated for ſoftening acrimonious humours, and allaying the tickling in the throat which provokes coughing.

838, b. *Black pectoral troches.*

Take of extract of liquorice, gum arabic, each four ounces; white ſugar, eight ounces. Boil the extract and gum in a ſufficient quantity of water till they are diſſolved: then having ſtrained the liquor, add to it the ſugar, and evaporate the mixture over a gentle fire, till it is of a proper conſiſtence for being formed into troches. *E.*

This compoſition is deſigned for the ſame purpoſes as the white pectoral troches above deſcribed.

838, c. *Pectoral troches with opium.* E.

Take of opium, balſam of Peru, of each one dram; fine ſugar, two drams; of the maſs for black pectoral troches, ſeven ounces. Rub the opium very well with the balſam and ſugar; then gradually add the maſs of troches well ſoftened with warm water. When all is very accurately mixed, form it into troches, each weighing 15 grains.

839. *Red-lead troches.*

Take of red-lead, half an ounce; corroſive mercury ſublimate, one ounce; crumb of the fineſt bread, four ounces. Make them up with roſe-water into oblong troches.

Red-lead troches are employed only for external purpoſes as eſcharotics: they are powerfully ſuch, and require a good deal of caution in their uſe.

840. *Troches of nitre.*

Take of nitre purified, four ounces; double-refined ſugar, one pound. Make them into troches with mucilage of gum tragacanth. *L.*

Take of nitre, three ounces; fine ſugar, nine ounces. Powder them together, and make them into troches with mucilage of gum tragacanth. *E.*

This is a very agreeable form for the exhibition of nitre; though, when the ſalt is thus taken without any liquid (if the quantity is conſiderable) it is apt to occaſion uneaſineſs about the ſtomach, which can only be prevented by large dilution with aqueous liquors.

841. *Troches of ſquills.* L.

Take of baked ſquills, half a pound; wheat flour, four ounces. Beat them together, and form the maſs into troches, which are to be dried with a gentle heat.

This preparation is uſed only as an ingredient in the *theriaca*.

842. *Troches of ſulphur.*

Take of flowers of ſulphur, waſhed, two ounces; double-refined ſugar, four ounces. Beat them together; and, adding ſome mucilage of quince ſeeds, form them into troches. *L.*

Take of flowers of ſulphur, two ounces; flowers of benzoin, one ſcruple; white ſugar, four ounces; factitious cinnabar, half a dram. Mucilage of gum tragacanth, as much as is ſufficient. Mix, and make them into troches, according to art.

Theſe compoſitions are to be conſidered only as agreeable forms for the exhibition of ſulphur, no alteration or addition being here made to its virtue; unleſs that by the flowers of the benzoin in the ſecond preſcription, the medicine is ſuppoſed to be rendered more efficacious as a pectoral.

843. *Troches of Japan earth.* L.

Take of Japan earth, gum arabic, each two ounces; ſugar of roſes, 16 ounces. Beat them together; and dropping in ſome water, make them into troches.

A preparation of this kind, with the addition of ambergris and muſk, which are here more prudently omitted, has long been in ſome eſteem as a mild reſtringent, &c. under the title of *catechu*. Theſe troches are ſufficiently palatable, and of conſiderable ſervice in ſome kinds of coughs, thin acrid defluxions, diarrhœas, &c.

844. *Cardialgic lozenges.* L.

Take of chalk prepared, four ounces; crabs-claws prepared, two ounces; bole armenic, or French bole, half an ounce; nutmegs, one ſcruple; double-refined ſugar, three ounces. Reduce theſe ingredients into powder, and make them into troches with water.

This compoſition is calculated againſt that uneaſy ſenſation at the ſtomach, improperly called the *heart-burn*; in which it oftentimes gives immediate relief, by abſorbing and neutralizing the acid juices that occaſion this diſorder. The abſorbent powders here made uſe of are of the moſt powerful kind, though there does not ſeem to be any occaſion for uſing more than one of them.

It is, however, to be obſerved, that abſorbent compoſitions, though very effectual for the intention, are accompanied with an inconvenience, which is frequently complained of in their uſe; their binding the belly. The following is free from this inconvenience.

845. *Laxative antacid lozenges.*

Take of magneſia alba, ſix ounces; double-refined ſugar, three ounces; nutmegs, one ſcruple. Mix them well together, and form them into troches with mucilage of gum tragacanth.

846. *Sugar of roſes.* L.

Take of red-roſe buds, freed from the heels, and haſtily dried, one ounce; double-refined ſugar, one pound. Reduce them ſeparately into powder; then mix, and moiſten them with water, that they may be formed into troches, which are to be dried by a gentle heat.

This preparation is chiefly valued for its agreeableneſs to the eye and palate. Some likewiſe eſteem it medicinally, as a light reſtringent; and look upon it, not undeſervedly, as an excellent addition to milk in phthiſical and hectic caſes.

847. *Anthelmintic ſugar-cakes.*

1. Take of powdered tin, half a dram; fine ſugar, half an ounce; roſe-water, a ſufficient quantity to make them into a maſs for tablets.
2. Take of ſcammony, mercurius dulcis, each four grains; fine ſugar, half an ounce; roſe-water, a ſufficient quantity to make them into tablets.

Theſe compoſitions are calculated for children, who are not eaſily prevailed upon to take anthelmintic medicines in leſs agreeable forms. If the firſt is made uſe of, it muſt be repeated three or four mornings ſucceſſively, after which a purge is to be taken; the ſecond, if it requires a repetition, is to be given only every other morning. The proportions of the ingredients are to be varied, according to the age and ſtrength of the patient.

848. *Nerve troches.*

Take of compound ſpirit of lavender, 60 drops; oil of cinnamon, oil of roſemary, each four drops; Florence orrice root, two drams; fine ſugar, one ounce; mucilage of gum tragacanth, as much as will reduce them into a maſs, which is to be formed into troches of about half a ſcruple each.

One or two of theſe troches taken occaſionally, and ſuffered to diſſolve in the mouth, prove ſerviceable to thoſe who are ſubject to paralytic and other nervous diſorders. Warm aromatic medicines, given in this form and manner, are ſuppoſed, from their ſlow diſſolution in the mouth, to affect the nervous ſyſtem more immediately than if received at once into the ſtomach.

849. *Purging tablets.*

Take of cryſtals of tartar, half an ounce; ſcammony, three drams; oil of cinnamon, four drops; double-refined ſugar, eight ounces. Make them up with roſe-water into troches, weighing each about a dram.

This is a ſufficiently elegant form for purgative troches. Each of the tablets contains two grains and a half of ſcammony.

850. *Rhubarb troches.*

Take of creme of tartar, rhubarb, each two drams; freſh lemon-peel, half a dram; fine ſugar, four ounces. Make them into troches with roſe-water.

Two drams of theſe troches contain about ſeven grains of rhubarb, and as much creme of tartar.

851. *Kunckel antimonial tablets.*

Take of the beſt Hungarian antimony, levigated into an impalpable powder, three drams and a half; ſweet almonds peeled, freſh pine-nuts, each half an ounce; cinnamon, one dram; leſſer cardamom ſeeds huſked, half a dram; double-refined ſugar, four ounces. Diſſolve the ſugar in equal quantities of cinnamon-water and roſe-water; then mix therewith the other ingredients, and form the whole into tablets weighing one dram each.

Theſe tablets were brought into eſteem by Kunckel, at a time when the internal uſe of crude antimony was almoſt univerſally reckoned poiſonous. He had recourſe to them as a deſperate medicine, in violent pains and contractions of the arms, after all the common methods of cure had been uſed without any relief; and being happily, in a ſhort time, perfectly freed from his complaints, he made trial of them in ſeveral other caſes with remarkable ſucceſs. He ſeems to have begun with doſes of four or five grains, (that is, one of the tablets above preſcribed); which were repeated thrice a day, and gradually increaſed to a dram or more of the antimony every day.

852. *Sialagogue troches.*

Take of pellitory of Spain, half an ounce; maſtich, two drams; oil of cloves and marjoram, each one dram; yellow wax, a ſufficient quantity. Make them into troches or pellets.

One of theſe troches is to be occaſionally held in the mouth, and chewed, to promote a diſcharge of ſaliva; which they effect by warming and ſtimulating the ſalival glands.

853. *Stomachic troches.*

Take of hard extract of Peruvian bark, one dram; oil of cinnamon, oil of mint, each ten drops; fine ſugar, four ounces. Make them into troches, with mucilage of gum tragacanth.

Theſe troches are of ſervice for warming and ſtrengthening the ſtomach, expelling flatulencies, and promoting digeſtion; for theſe purpoſes they are as effectual as any thing that can well be contrived in this form.

SECT. III. *Pills.*

854. To this form are peculiarly adapted thoſe drugs which operate in a ſmall doſe; and whoſe nauſeous and offenſive taſte or ſmell require them to be concealed from the palate.

Pills diſſolve the moſt difficultly in the ſtomach, and produce the moſt gradual and laſting effects, of all the internal forms. This is, in ſome caſes, of great advantage; in others, it is a quality not at all deſirable; and ſometimes it may even be of dangerous conſequence, particularly with regard to emetics, which if they paſs the ſtomach undiſſolved, and afterwards exert themſelves in the inteſtines, operate there as violent cathartics.

Hence emetics are, among us, ſcarce ever given in pills. And hence to the reſinous and difficultly ſoluble ſubſtances, ſaponaceous ones ought to be added, in order to promote their ſolution.

Gummy reſins and inſpiſſated juices, are ſometimes ſoft enough to be made into pills, without addition: where any moiſture is requiſite, ſpirit of wine is more proper than ſyrups or conſerves, as it unites more readily with them, and does not ſenſibly increaſe their bulk. Light, dry powders, require ſyrup or mucilages; and the more ponderous, as the mercurial and other metallic preparations, thick honey, conſerve, or extracts.

Light powders require about half their weight of ſyrup; of honey, about three-fourths their weight; to reduce them into a due conſiſtence for forming pills. Half a dram of the maſs will make five or ſix pills of a moderate ſize.

General rules for making pills.

I. The three firſt rules, formerly laid down for making

king powders, are here alſo to be carefully obſerved.

II. Gums and inſpiſſated juices are to be firſt ſoftened with the liquid preſcribed: then add the powders, and continue beating them all together till they are perfectly mixed.

III. The maſſes for pills are beſt kept in bladders, which ſhould be moiſtened now and then with ſome kind of liquid that the maſs was made up with, or with ſome proper aromatic oil.

855. *Ethiopic pills.* E.

Take of quickſilver, ſix drams; honey, half an ounce; golden ſulphur of antimony, gum guaiacum in powder, of each half an ounce. Having rubbed the quickſilver with the honey in a glaſs mortar, till the globules ceaſe to appear, add the ſulphur of antimony: then with mucilage of gum arabic make them into a maſs of a proper conſiſtence for pills.

Theſe pills reſemble Dr Plummer's, deſcribed in the Edin. Eſſays, (ſee n° 773. *ſupra;*) to which they are preferable in one reſpect, that they are leſs apt to run off by ſtool. They are an uſeful alterative both in cutaneous and venereal diſorders. One-fourth part of the quantity above preſcribed may be made into 60 pills; of which from one to four may be taken every night and morning, the patient keeping moderately warm during the whole time that this courſe is continued.

856. *Aromatic pills.* L.

Take of ſocotorine aloes, an ounce and a half; gum guaiacum, one ounce; aromatic ſpecies, balſam of Peru, each half an ounce. Reduce the aloes and gum guaiacum ſeparately into powder; then mix them with the reſt, and make the whole into a maſs with a ſufficient quantity of ſyrup of orange-peel.

Theſe pills, taken in ſmall doſes, as half a ſcruple or little more, and occaſionally repeated, warm the ſtomach, and by degrees the whole habit, and promote perſpiration and all the natural ſecretions. If the doſe is conſiderable, they operate gently by ſtool: and if continued for ſome time in ſmaller doſes, they prove at length purgative, or introduce a ſalutary looſeneſs.

857. *Aloetic pills.*

Take of ſocotorine aloes in powder, extract of gentian, of each two ounces; ſal polychreſt in powder, half an ounce. Mix, and make them into a maſs of pills with ſimple ſyrup.

858. *Jalap pills.* E.

Take of extract of jalap, two ounces; aromatic ſpecies, half an ounce; ſimple ſyrup, a ſufficient quantity. Beat them into a maſs.

This compoſition was firſt received into the former edition of the pharmacopœia. One of the ſame kind, with powdered jalap in ſubſtance inſtead of the extract, is uſed in ſome of the London hoſpitals, as a cheap and effectual purge.

859. *Pills of ſcammony with aloes.*

Take of ſocotorine aloes, one dram; aromatic ſpecies, half a dram; ſcammony, one ſcruple; ſoft extract of liquorice, as much as is ſufficient to reduce them into a maſs of a due conſiſtence for being formed into pills.

This warm purgative is recommended for removing the crudities, &c. after a ſurfeit or debauch, and for preventing arthritic and other complaints incident to thoſe who live high. The quantity above preſcribed may be made into 30 pills, of which five or ſix are to be taken for a doſe.

860. *The more ſimple colocynth pills.* L.

Take of pith of colocynth, ſcammony, each two ounces; oil of cloves, two drams. Pulverize the coloquintida and ſcammony by themſelves, then mix in the oil, and make the whole into a maſs with ſyrup of buckthorn.

The operator ſhould be careful, in pulveriſing the colocynth, to avoid the finer particles that fly off from it; which, though they do not conſiderably affect the mouth or fauces, have ſometimes been obſerved to occaſion violent purging. The drug ſhould firſt be well dried, cut with ſheers into ſmall pieces, and freed from the ſeeds; then rub it in an oiled mortar, adding a few drops of ſweet oil occaſionally during the trituration: afterwards mix this powder with the powdered ſcammony, add the eſſential oil preſcribed, and make the mixture into a maſs, as above directed. The compoſition is apt to grow ſtiff and dry in keeping, and therefore ought to be made pretty ſoft at firſt: the pills ſhould be formed as they are wanted; for when long kept, they become ſo hard, as to have ſometimes paſſed through the inteſtines undiſſolved.

Theſe pills (formerly called *pilulæ de duobus*, or pills of two ingredients) are very ſtrong cathartics, and ought not to be ventured upon in caſes where leſs violent medicines will take effect. They have been often made uſe of in large doſes, along with large doſes alſo of mercurials, in venereal complaints, both in recent gonorrhœas, and in the ſwellings and inflammations which ſometimes follow from the ſuppreſſion of the diſcharge; but in both theſe caſes they are apparently improper, as they generally injure the conſtitution, and as the latter complaint is for the moſt part aggravated by them. The doſe is from 15 grains to half a dram: ſome have imprudently gone as far as two ſcruples.

861. *The pills called* cochiæ. E.

Take of coloquintida, one ounce; ſcammony, ſocotorine aloes, each two ounces; vitriolated tartar, two drams; oil of cloves, two drams; mucilage of gum arabic, a ſufficient quantity. Powder the aloes, ſcammony, and ſalt, together; then add the colocynth in very fine powder, and the oil; laſtly, with the mucilage make the whole into a maſs of pills.

This compoſition, like the foregoing, is ſtrongly cathartic; not leſs effectual, though ſomewhat leſs irritating.

862. *Colocynth pills with aloes.* L.

Take of ſocotorine aloes, ſcammony, each two ounces; pith of colocynth, one ounce; oil of cloves, two drams. Let the dry ſpecies be ſeparately reduced to powder; then mix in the oil, and make the whole into a maſs with ſyrup of buckthorn.

By the diminution of coloquintida in this preſcription, the ingredients are reduced to the proportions wherein they are ſet down in the original of Galen; and what is of greater conſequence, the medicine becomes leſs ungrateful to the ſtomach, and leſs virulent in its operation.

863. *Deobſtruent pills.* L.

Take of the aromatic pills, three ounces; rhubarb, extract of gentian, ſalt of ſteel, each one ounce; ſalt of wormwood, half an ounce. Beat them together into a maſs, with ſolutive ſyrup of roſes.

It is difficult to bring this maſs into the due conſiſtence, the two ſalts acting upon one another ſo as to make it ſwell and crumble. Notwithſtanding the alkaline ſalt employed, the pill does not prove at all alkaline; for the acid of the ſalt of ſteel forſakes its metal, and unites with the alkali into a vitriolated tartar: whence ſome have propoſed uſing, inſtead of the two ſalts here directed, an ounce of vitriolated tartar already made, and half an ounce of any of the calces of iron: this, they obſerve, prevents the inconveniency abovementioned, without making any apparent alteration in the quality of the medicine.

864. *Chalybeate ecphractic pills.*

Take of the maſs of common pills, called *Rufus's pills* deſcribed hereafter, one ounce and a half; gum ammoniacum, reſin of guaiacum, each half an ounce; ſalt of ſteel, five drams; ſyrup of orange-peel, as much as is ſufficient to reduce the whole into a maſs.

Both theſe and the foregoing pills are very well calculated for anſwering the intention expreſſed in the title. A dram of the maſs may be made into 12 pills, and two or three of theſe taken every night, or oftener, in chlorotic, or other caſes, where warm, aperient, or deobſtruent medicines are proper.

865. *Purging deobſtruent pills.*

Take of ſocotorine aloes, extract of black hellebore, ſcammony, each one ounce; gum ammoniacum, reſin of guaiacum, each half an ounce; vitriolated tartar, two drams; eſſential oil of juniper-berries, one dram. Beat them into a maſs, with a ſufficient quantity of ſyrup of buckthorn.

This compoſition may be given from eight or ten grains to a ſcruple or half a dram, according as it is intended to keep the belly open or to purge. Half a dram of the maſs contains about ſix grains of each of the capital purgative ingredients; aloes, ſcammony, and extract of hellebore.

866. *Fetid pills.*

Take of aſafetida, Ruſſia caſtor, each one dram and a half; camphor half a dram; oil of hartſhorn, 24 drops. Beat the camphor with the aſafetida, then add the caſtor and oil of hartſhorn, and make the whole into a maſs.

867. *Gum pills.*

Take of galbanum, opopanax, myrrh, ſagapenum, each one ounce; aſafetida, half an ounce. Make them into a maſs with ſyrup of ſaffron. *L.*

Take of aſafetida, galbanum, myrrh, of each two ounces; rectified oil of amber, one dram. Mix and make them into a maſs with common ſyrup. *E.*

All theſe pills are deſigned for antihyſterics and emmenagogues, and very well calculated for anſwering thoſe intentions: half a ſcruple, a ſcruple, or more, may be taken every night or oftener.

The following compoſitions are calculated for the ſame intentions as the foregoing deobſtruent, fetid, and gum pills.

1. Take of aſafetida, wood-ſoot, myrrh, each two ounces; oil of amber, one dram and a half; ſyrup of ſugar, a ſufficient quantity. Mix, and make them into a maſs, according to art.
2. Take of aſafetida, one dram; martial flowers, half a dram; oil of amber, eight drops; balſam of Peru, a ſufficient quantity to reduce them into a maſs.
3. Take of aſafetida, gum ammoniacum, myrrh, aloes, ruſt of ſteel prepared, extract of gentian, each one ſcruple; ſyrup of ginger, as much as will make the other ingredients into a maſs.
4. Take of galbanum, one dram; ſalt of ſteel, half a dram; aſafetida, aromatic ſpecies, each one ſcruple; tincture of myrrh, as much as will make them into a maſs.

A dram of either of the maſſes is to be made into 12 pills, one or two of which may be taken for a doſe twice or thrice a-day.

868. *Mercurial pills.*

Take of purified quickſilver, honey, each one ounce; crumb of bread, two ounces. Grind them together in a glaſs-mortar till the mercurial globules ceaſe to appear; then add a ſufficient quantity ot common ſyrup, and make the whole into a maſs according to art. *E.*

Take of quickſilver, five drams; Straſburgh turpentine, two drams; cathartic extract, four ſcruples; rhubarb powdered, one dram. Grind the quickſilver with the turpentine until they are perfectly incorporated; then let the other ingredients be beat up with this mixture into a maſs. If the turpentine happens to be too thick, ſoften it with a little oil-olive. *L.*

869. *Laxative mercurial pills.*

Take of pure quickſilver, one ounce; reſin of guaiacum, extract of hellebore, powdered rhubarb, each half an ounce; common ſyrup, a ſufficient quantity. Grind the quickſilver with the reſin of guaiacum until they are perfectly incorporated; then add the other ingredients, and beat the whole into a maſs according to art.

The three foregoing compoſitions are uſeful mercurial pills; the firſt as an alterative, the other two as purgative mercurials. They are all, however, liable to an inconvenience, uncertainty in regard to their ſtrength: for the mercury is but looſely united with the other ingredients, and very apt to ſeparate and run together in its original form; in which ſtate it never exerts its proper virtue: though it appears perfectly extinguiſhed by the matters it is ground with at firſt, part of it is apt to be ſpued out on beating up the mixture with the other ingredients into a maſs.

870. *Gamboge pills.*

Take of ſocotorine aloes, extract of black hellebore, gamboge, mercurius dulcis, each two drams; eſſential oil of juniper-berries, half a dram; ſyrup of buckthorn, a ſufficient quantity. Beat them into a maſs.

This is a ſtrong mercurial purgative, in which the mercurial preparation is not liable to the uncertainty which the crude quickſilver is accompanied with in the foregoing compoſitions. The doſe is from 10 or 15 grains to half a dram.

871, a. *Thebaic, commonly called the* pacific pills. E.

Take of opium, half an ounce; extract of liquorice, two ounces; Caſtile ſoap, an ounce and a half; Jamaica pepper, one ounce. Soften the opium and extract ſeparately with water; then mix them together, and add the ſoap and pepper in powder; after which beat all well together into a maſs.

871, b. *Saponaceous pills.* L.

Take of almond-ſoap, four ounces; ſtrained opium, half an ounce; eſſence of lemons, one dram. Soften the opium with a little wine; and then beat it with the reſt, until they are perfectly mixed.

Theſe are introduced in the room of thoſe formerly ſo much celebrated under the name of *Starkey's* or *Matthews's* pills. The ſoap promotes the ſolution of the opium in the ſtomach, and thus occaſions it to act the more quickly. The eſſence of lemons, in the laſt of theſe preſcriptions, gives an agreeable flavour, makes the medicine ſit eaſier on the ſtomach, and prevents a nauſea, which it would otherwiſe be apt to occaſion. Ten grains of the pill contain nearly one grain of opium.

871, c. *Storax pills.* L.

Take of ſtrained ſtorax, two ounces; ſaffron, one ounce; ſtrained opium, five drams. Beat them together till perfectly united.

Theſe are contrived for diſſolving more ſlowly in the ſtomach than the ſaponaceous pills, and conſequently producing more gradual and laſting effects.

871, d. *Olibanum pills.* E.

Take of olibanum, two ounces; myrrh, one ounce; opium, five drams; balſam of Peru, two drams; common ſyrup, a ſufficient quantity. Make them into a maſs; which ſupplies the place of the ſtorax pills.

872. *Pectoral pills.*

Take of gum ammoniacum, half an ounce; balſam of Tolu, two drams; flowers of benzoin, Engliſh ſaffron, each one dram; common ſyrup, a ſufficient quantity. Make them into a maſs according to art.

This compoſition is very well contrived for promoting expectoration; and may be uſefully given in common colds, and in difficulty of breathing proceeding from viſcid phlegm: the doſe is from ſix or eight grains to a ſcruple or more.

873. *Rufus's pills.* L.

Take of ſocotorine aloes, two ounces; myrrh, ſaffron, each one ounce. Make them into a maſs with ſyrup of ſaffron. *L.*

Take of ſocotorine aloes, two ounces; myrrh, one ounce; ſaffron, half an ounce. Beat them into a maſs with a proper quantity of ſyrup of orange-peel. *E.*

The pills, given to the quantity of half a dram or two ſcruples, prove conſiderably cathartic; but they anſwer much better purpoſes in ſmaller doſes as laxatives or alteratives.

874. *Squill pills.*

Take of Spaniſh ſoap, one ounce; gum ammoniacum, millepedes prepared, freſh ſquills, each half an ounce; balſam of Copaiba, as much as is ſufficient. Reduce them into a maſs according to art.

This is an elegant and commodious form for the exhibition of ſquills, whether for promoting expectoration, or in the other intentions to which that medicine is applied.

875. *Pills againſt the dyſentery.*

Take of yellow wax, half an ounce; ſpermaceti, Japan earth, each one dram; oil of cinnamon, twelve drops. Make them into a maſs.

This medicine has often been of great benefit for the purpoſe expreſſed in its title; at the ſame time ſtrengthening the inteſtines, and covering them with a ſoft mucus, which defends them from being irritated by the acrimony of the humours. Each half dram of the maſs may be formed into five or ſix pills for one or two doſes.

876. *Spermaceti pills.*

Take of ſpermaceti, one dram; white ſugar-candy in powder, two drams; balſamic ſyrup, as much as is ſufficient. Grind the ſpermaceti with the ſugar till they are perfectly mixed; then adding the ſyrup, rub them with a warm peſtle into an uniform maſs.

Where ſpermaceti cannot be commodiouſly exhibited in any other form, three or four moderate-ſized pills, made from this maſs, may be taken two or three times a-day, in eroſions of the viſcera by acrimonious humours, tickling coughs, and other like diſorders.

877. *Plummer's pills.* E.

Take of ſweet mercury, golden ſulphur of antimony, of each ſix drams; extract of liquorice, half an ounce; rub the mercury with the ſulphur till they are thoroughly incorporated; then add the extract, and with mucilage of gum arabic make the whole into a maſs.

SECT. IV. *Boluſes.*

878. BOLUSES differ little in conſiſtence from electuaries, being only ſomewhat ſtiffer, ſo as to retain their figure without ſpreading or falling flat.

This form is very convenient for the exhibition of the more powerful medicines, which require their doſes to be exactly adjuſted, as the ſtronger alexipharmacs, cathartics, and opiates. As boluſes are chiefly intended for immediate uſe, volatile ſalts, and other materials, which, if the maſs was to be kept, would exhale or ſwell it, are frequently admitted into them.

The quantity of a bolus very ſeldom exceeds a dram: if the ingredients are of the lighter kind, even this will be too bulky to be commodiouſly ſwallowed down.

The lighter powders are made up with ſyrup; a ſcruple or 26 grains of the powder, with as much ſyrup as will bring it to a due conſiſtence, makes a bolus ſufficiently large.

The more ponderous powders, as the mercurial ones, are commonly made up with conſerve, ſyrups ſcarce holding them together. For the teſtaceous powders alſo an addition of conſerve is uſed; though, if made up with this alone, they would be too bulky.

Both the light and ponderous powders may be conveniently made up with mucilage, which increaſes the bulk leſs than the other additions, and occaſions them to paſs down more freely.

The officinal pharmacopœias have no formula of this kind: moſt of the following compoſitions are taken from our hoſpitals.

879. *Alexipharmac bolus.*

1. Take of compound powder of contrayerva, half a ſcruple; ſyrup of wild poppies, a ſufficient quantity to make it into a bolus.
2. Take of contrayerva root, half a ſcruple; ſyrup of ſaffron, as much as is ſufficient. Make them into a bolus.
3. Take of Virginian ſnakeroot, half a ſcruple; confection of kermes, as much as is ſufficient. Mix and make them into a bolus.
4. Take of Virginian ſnakeroot, contrayerva root, each eight grains; ſaffron, three grains; ſyrup of meconium, a ſufficient quantity to reduce them into a bolus.
5. Take of camphor, two grains; ſaffron, five grains; cordial confection, one ſcruple. Mix and make them into a bolus.
6. Take of camphor, two grains; nitre, contrayerva root, each ten grains; ſyrup of clove-julyflowers, as much as will make them into a bolus.
7. Take of muſk, ten grains; ſalt of hartſhorn, or of ſal ammoniac, five grains; Thebaic extract, half a grain; ſyrup of ſaffron, a ſufficient quantity. Make them into a bolus.

Theſe boluſes are deſigned for low depreſſed fevers, in which medicines of this kind are generally preſcribed, for keeping up the vis vitæ, raiſing the pulſe, and promoting a diaphoreſis. The compoſitions differ in ſtrength, nearly according to the order in which they ſtand. The laſt is of great power, and deſigned chiefly for caſes accompanied with convulſive ſymptoms, which are often abated by it.

880. *Caſtor bolus.*

Take of caſtor, one ſcruple; ſalt of hartſhorn, five grains; or oil of hartſhorn, five drops; ſimple ſyrup, a ſufficient quantity. Make them into a bolus.

This medicine is given in hyſterical and hypochondriacal diſorders, and likewiſe as an alexipharmac in fevers. Its virtues, which are great and unqueſtionable, ſeem to depend more on the fetid animal-oil, or volatile ſalt, than on the drug from whence it takes its name.

881. *Diaphoretic bolus.*

Take of compound powder of contrayerva, crude ſal ammoniac, each one ſcruple; ſimple ſyrup, a ſufficient quantity to form them into a bolus.

This bolus is given in fevers, and other caſes where a diaphoreſis is to be promoted. Sal ammoniac is for this purpoſe one of the moſt efficacious of the neutral ſalts. It requires, however, when thus given in a ſolid form, to be aſſiſted by warm diluents, frequently repeated; which not only promote its action, but likewiſe prevent its ſitting uneaſy on the ſtomach.

882. *Diuretic bolus.*

Take of freſh ſquills, ſix grains; compound powder of arum, ten grains; ginger, five grains; ſyrup of orange-peel, a ſufficient quantity. Make them into a bolus.

This compoſition is recommended by Dr Mead, to be taken every morning in hydropic caſes, for promoting urine. He obſerves, that in theſe diſorders, diuretic medicines vary greatly in their effects, thoſe which anſwer ſufficiently in one perſon failing in another; and that the ſquill and its preparations are of all others thoſe which moſt generally ſucceed.

883. *Bolus againſt the dyſentery.*

Take of the cordial confection, French bole, each one ſcruple; thebaic extract, one grain. Make them into a bolus.

This compoſition is excellently well calculated for the purpoſe expreſſed in its title. Dr Mead aſſures us, that he has never found any one medicine more effectual, either for reſtraining the flux, or healing the exulcerated membranes. Previous to the uſe of this or other like medicines, the firſt paſſages muſt be cleanſed by mild emetics and cathartics, as ipecacoanha and rhubarb.

884. *Emmenagogue bolus.*

Take of ſocotorine aloes, eight grains; ſaffron, four grains; Guinea pepper, two grains; oil of ſavin, two drops; conſerve of rue, as much as is ſufficient to reduce them into a due conſiſtence.

Take of black hellebore root, eight grains; freſh ſquills, four grains; eſſential oil of pepper-mint, two drops; conſerve of orange-peel, as much as is ſufficient to make them into a bolus.

Theſe are medicines of great power for promoting or exciting the menſtrual flux. The firſt is calculated for lax phlegmatic habits; the other for perſons of a ſanguine temperament, where chalybeate medicines cannot be borne.

885. *Febrifuge bolus.*

Take of Peruvian bark, one ſcruple; caſcarilla, half a ſcruple: mucilage of quince ſeeds, a ſufficient quantity to make them into a bolus.

This elegant compoſition is excellently well adapted to the cure of intermittent fevers, and may be given in caſes where the Peruvian bark by itſelf would be leſs proper. Where aromatics, chalybeates, bitters, &c. are alſo requiſite, they are either to be premiſed, or occaſionally interpoſed.

886. *Hyſteric bolus.*

Take of muſk, aſafetida, each ſix grains; caſtor, half a ſcruple; ſyrup of ſaffron, as much as is ſufficient to make them into a bolus.

This medicine is a very well contrived one for the purpoſe expreſſed in its title. It is of great ſervice both in hyſterical and hypochondriacal diſorders; and often gives relief in the depreſſions, faintings, flatulent

lent colics, headachs, and other ſymptoms attending them. It may be taken twice a-day along with any ſuitable liquor.

887. *Iliac bolus.*

Take of cathartic extract, one ſcruple; thebaic extract, one grain. Make them into a bolus.

This bolus is preſcribed by Dr Mead for eaſing the pain and procuring ſtools in the iliac-paſſion and dry belly-ach; where the irritating cathartics, exhibited by themſelves, are thrown up by vomit. The uſe of this medicine is to be preceded by plentiful bleeding, and accompanied with purgative glyſters of the more acrid kind; and its operation promoted by infuſion of ſena mixed with a little of the elixir of health, or tincture of ſena.

888. *Mercurial bolus.*

Take of calomel, from five to fifteen grains; conſerve of roſes, half a dram. Mix, and make them into a bolus.

This bolus is given every night, or oftener, for raiſing a ſalivation in venereal and other diſorders, which require that Herculean operation. It is likewiſe taken at night as an alterative, to be carried off next morning by a cathartic: mercurials exhibited in this manner, have generally better effects than when joined with purgatives directly.

889. *Pectoral bolus.*

Take of ſpermaceti, fifteen grains; gum ammoniacum, ten grains; ſalt of hartſhorn, five grains; ſimple ſyrup, as much as is ſufficient. Mix, and make them into a bolus.

In colds of long ſtanding, old coughs, aſthmas, and beginning conſumptions, this bolus generally gives relief; eſpecially if bleeding is premiſed, and repeated, if neceſſary, at proper intervals.

890. *Bolus of rhubarb with mercury.*

Take of choice rhubarb, twenty-five grains; calomel, five grains; ſimple ſyrup, as much as will form them into a bolus.

This is a very mild mercurial purgative. It is given to deſtroy worms, and in cachectic, chlorotic, and other like diſorders.

891. *Rheumatic bolus.*

Take of extract of guaiacum, half a dram; ſalt of hartſhorn, ſeven grains; ſimple ſyrup, a ſufficient quantity. Make them into a bolus.

In chronical rheumatiſms, whether the remains of a rheumatic fever, or a continuation of pains that proceeded at firſt from neglected colds, this bolus has been given with good effects once a-week, or oftener, the patient keeping warm, and drinking warm liquors to promote its operation as a cathartic and diaphoretic. Its uſe ought to be accompanied by venæſection, which is to be repeated every eight or ten days as long as the blood is ſizy.

892. *Sudorific bolus.*

Take of camphor, five grains; thebaic extract, one grain; ſyrup of orange-peel, a ſufficient quantity to reduce them into a bolus.

This medicine is one of the moſt effectual ſudorifics, generally exciting a copious ſweat.

SECT. V. *Electuaries.*

893. ELECTUARIES are compoſed chiefly of powders mixed up with ſyrups, &c. into ſuch a conſiſtence that the powders may not ſeparate in keeping, that a doſe may be eaſily taken up on the point of a knife, and not prove too ſtiff to ſwallow.

Electuaries receive chiefly the milder alterative medicines, and ſuch as are not ungrateful to the palate. The more powerful drugs, as cathartics, emetics, opiates, and the like, (except in officinal electuaries to be diſpenſed by weight), are ſeldom truſted in this form, on account of the uncertainty of the doſe; diſguſtful ones, acrids, bitters, fœtids, cannot be conveniently taken in it; nor is the form of an electuary well fitted for the more ponderous ſubſtances, as mercurials, theſe being apt to ſubſide in keeping, unleſs the compoſition is made too ſtiff.

The lighter powders require thrice their weight of honey, or ſyrup boiled to the thickneſs of honey, to make them into the conſiſtence of an electuary; of ſyrups of the common conſiſtence, twice the weight of the powders is ſufficient.

Where the common ſyrups are employed, it is neceſſary to add likewiſe a little conſerve, to prevent the compound from drying too ſoon. Electuaries of Peruvian bark, for inſtance, made up with ſyrup alone, will often in a day or two grow too dry for taking.

Some powders, eſpecially thoſe of the leſs grateful kind, are more conveniently made up with mucilages than with ſyrups, honey, or conſerve. The three latter ſtick about the mouth and fauces, and thus occaſion the taſte of the medicine to remain for a conſiderable time; whilſt mucilages paſs freely, without leaving any taſte in the mouth. A little ſoft extract of liquorice, joined to the mucilage, renders the compoſition ſufficiently grateful, without the inconveniences of the more adheſive ſweets.

The quantity of an electuary directed at a time, in extemporaneous preſcription, is rarely leſs than an ounce, or more than three ounces.

General rules for making electuaries.

I. The rules already laid down for decoctions and powders in general, are likewiſe to be obſerved in making decoctions and powders for electuaries.

II. Gums, inſpiſſated juices, and ſuch other ſubſtances as are not pulverable, ſhould be diſſolved in the liquor preſcribed: then add the powders by little and little, and keep the whole briſkly ſtirring, ſo as to make an equable and uniform mixture.

III. Aſtringent electuaries, and ſuch as have pulps of fruits in their compoſition, ſhould be prepared only in ſmall quantities at a time: for aſtringent medicines loſe greatly of their virtues on being kept in this form, and the pulps of fruits are apt to become ſour.

IV. The ſuperfluous moiſture of the pulps ſhould be exhaled over a gentle fire before the other ingredients are added to them.

V. Electuaries, if they grow dry in keeping, are to be reduced to the due conſiſtence, with the addition of a little Canary wine, and not with ſyrup or honey;

ney: by this means the doſe will be the leaſt uncertain; a circumſtance deſerving particular regard, in thoſe eſpecially which are made up with ſyrup, and contain a large quantity of opium, as the confection called *paulina* and *philonium*, nº 902. & 904.

894. *Electuary of caſſia.* L.

Take of ſolutive ſyrup of roſes, pulp of caſſia, freſh extracted, each half a pound; manna, two ounces; pulp of tamarinds, one ounce. Grind the manna in a mortar, and with a gentle heat diſſolve it in the ſyrup: then add the pulps, and continue the heat until the whole is reduced to a due conſiſtence.

895. *Diacaſſia.* E.

Take of pulp of caſſia, ſix ounces; pulp of tamarinds, Calabrian manna, of each an ounce and a half; ſyrup of pale roſes, ſix ounces. Diſſolve the manna, beat in a mortar, in the ſyrup with a gentle heat; then mix in the pulps, ſo as to make the whole into an uniform electuary, according to art.

Theſe compoſitions are very convenient officinals to ſerve as a baſis for purgative electuaries, and other like purpoſes; as the pulping a ſmall quantity of the fruits, for extemporaneous preſcription, is ſufficiently troubleſome. The tamarinds give them an agreeable taſte, and do not ſubject them, as might be expected, to turn ſour: after ſtanding for four months, the compoſition was found no ſourer than when firſt made up. They are likewiſe uſually taken by themſelves, in the quantity of two or three drams occaſionally, for gently looſening the belly in coſtive habits.

896. *Lenitive electuary.*

Take of figs, one pound; ſena, eight ounces; pulp of tamarinds, pulp of caſſia, pulp of French prunes, each half a pound; coriander ſeeds, four ounces; liquorice, three ounces; double-refined ſugar, two pounds and a half. Pulveriſe the ſena along with the coriander-ſeeds, and ſift out ten ounces of the powder; the remainder is to be boiled with the figs and liquorice, in four pints of water to one half; then ſtrain and preſs out the liquor, and evaporate it to the weight of a pound and a half, or ſomewhat leſs: in this diſſolve the ſugar, ſo as to make it into a ſyrup; and add this ſyrup, by little and little, to the pulps: laſtly, mix in the powder before ſeparated by the ſieve. *L.*

This electuary may be occaſionally taken to the quantity of a nutmeg or more, for looſening the belly in coſtive habits. It is frequently employed in glyſters, though for that uſe the following is rather more convenient.

Take of ſena, eight ounces; coriander-ſeeds, four ounces; pulp of prunes, two pounds. Powder the leaves and ſeeds; then add the pulps, and mix the whole well together, ſo as to make them into an electuary. *E.*

897. *Pectoral electuary.*

Take of rob of elder-berries, two ounces; ſpermaceti diſſolved in a ſufficient quantity of yolk of eggs, half an ounce; flowers of benzoine, one dram; balſamic ſyrup, as much as is ſufficient to make the other ingredients into an electuary.

This is a very uſeful medicine in tickling coughs and common colds, calculated both to obtund acrimony and promote expectoration. It may be uſed two or three times a-day, in doſes of about the quantity of a ſmall nutmeg. Taken to the bulk of a large nutmeg, at bed-time, it generally not only relieves the breaſt, but tends to procure a ſalutary diaphoreſis or ſweat in the night.

898. *Electuary of ſcammony.* L.

Take of ſcammony, an ounce and a half; cloves, ginger, each ſix drams; eſſential oil of caraway-ſeeds, half a dram; honey, half a pound. Let the ſpices be ground together, and mixed with the honey; then add the powdered ſcammony, and afterwards the oil.

This electuary is a warm briſk purgative. It is a reform of the *electuarium caryocoſtinum* of our preceding diſpenſatories; a compoſition which was greatly complained of, as being inconvenient to take on account of the largeneſs of its doſe. A dram and a half of this, which contains fifteen grains of ſcammony, is equivalent to half an ounce of the other.

899. *Japonic confection.* E.

Take of Japan earth, four ounces; gum kino, three ounces; nutmeg, and cinnamon, each one ounce; opium diſſolved in a ſufficient quantity of white-wine, half a dram; ſyrup of dry roſes, boiled to the thickneſs of honey, thrice the weight of the powders. Mix and make them into an electuary, which ſupplies the place of diaſcordium.—It is a moderately warm aſtringent and opiate.

900. *Locatelli's balſam.*

Take of oil-olive, one pint; Straſburg turpentine, yellow wax, each half a pound; red ſaunders, ſix drams. Melt the wax over a gentle fire, with ſome part of the oil; then add the reſt of the oil, and the turpentine; afterwards mix in the ſaunders, and keep them ſtirring together, until the mixture is grown cold. *L.*

Take of yellow wax, one pound; oil of olive, a pint and a half; Chio or Straſburgh turpentine, a pound and a half; balſam of Peru, two ounces; dragons blood, in powder, one ounce, Melt the wax in the oil over a gentle fire, then add the turpentine; and having taken them from the fire, mix in the balſam of Peru and dragons blood, keeping them continually ſtirring till grown cold.

Dragons blood gives a more elegant colour to this compoſition than red ſaunders; though on another account it is ſomewhat leſs proper, having been found, when diſſolved in oil, to communicate ſome degree of heat and pungency, qualities quite foreign to the intention of the medicine. This balſam is uſed in internal bruiſes and hæmorrhages, eroſions of the inteſtines, dyſenteries, and in ſome kinds of coughs and aſthmas: the doſe is from two ſcruples to two drams: it may be commodiouſly taken with about double its weight of conſerve of roſes, as directed hereafter. Some have likewiſe applied it externally, for deterging and incarnating recent wounds and ulcers.

901. *Cordial confection.* E.

Take of conſerve of roſemary flowers, three ounces;

candied nutmegs, one ounce and a half; candied ginger, ſix drams; cinnamon in fine powder, half an ounce; ſyrup of orange-peel, as much as is ſufficient. Mix them into an electuary, acccording to art.

Particular care ought to be had in the choice of the eſſential oil; for on its goodneſs, that of the medicine in great meaſure depends.

902. *The confection called* paulina. L.

Take of coſtus, or (in its ſtead) zedoary; cinnamon, long pepper, black pepper; ſtorax, galbanum, opium, ſtrained; each two ounces: Ruſſia caſtor, two ounces; ſimple ſyrup, boiled to the conſiſtence of honey, thrice the weight of the other ingredients. Warm the ſyrup, and carefully mix with it the opium firſt diſſolved in wine: gradually add this mixture, whilſt it continues warm, to the ſtorax and galbanum previouſly melted together; and afterwards ſprinkle in the other ſpecies reduced into powder.

This is a warm opiate medicine, and as ſuch is ſometimes made uſe of in practice: thirty-two grains contain one grain of opium.

903, a. *Mithridate, or the confection of Damocrates.* L.

Take of cinnamon, fourteen drams; myrrh, eleven drams; agaric, Indian nard, ginger, ſaffron, ſeeds of Mithridate-muſtard, frankincenſe, Chio turpentine, each ten drams; camels hay, coſtus or (in its ſtread) zedoary, Indian leaf or (in its ſtead) mace, ſtœchas, long pepper, hartwort ſeeds, hypociſtis, ſtorax ſtrained, opopanax, galbanum ſtrained, opobalſam or (in its ſtead) expreſſed oil of nutmegs, Ruſſia caſtor, each one ounce; mountain poley, ſcordium, carpobalſam or (in its ſtead) cubebs, white pepper, Candy carrot ſeed, bdellium ſtrained, each ſeven drams; Celtic nard, gentian root, dittany of Crete, red roſes, Macedonian parſley ſeed, leſſer-cardamom ſeeds huſked, ſweet-fennel ſeed, gum arabic, opium ſtrained, each five drams; calamus aromaticus, wild valerian root, aniſeed, ſagapenum ſtrained, each three drams; meum athamanticum, St John's wort, acacia or (in its ſtead) terra Japonica, bellies of ſkinks, each two drams and a half; clarified honey, thrice the weight of all the other ingredients. Warm the honey, and mix with it the opium diſſolved with wine; melt the ſtorax, galbanum, turpentine, and opobalſam (or expreſſed oil of nutmegs) together in another veſſel, continually ſtirring them about to prevent their burning; with theſe ſo melted, mix the hot honey, at firſt by ſpoonfuls, and afterwards in larger quantities at a time; when the whole is grown almoſt cold, add by degrees the other ſpecies reduced into powder.

903, b. *Theriaca Andromachi*, or *Venice treacle*. L.

Take of troches of ſquills, half a pound:—long pepper, opium ſtrained, vipers dried, each three ounces:—cinnamon, opobalſam, or (in its ſtead) expreſſed oil of nutmegs, each two ounces:—agaric, Florence orris root, ſcordium, red roſes, navew ſeeds, extract of liquorice, each an ounce and a half:—Indian nard, ſaffron, amomum, myrrh, coſtus or (in its ſtead) zedoary, camels hay, each one ounce:—cinquefoil root, rhubarb, ginger, Indian leaf or (in its ſtead) mace, dittany of Crete, horehound leaves, calamint leaves, ſtœchas, black pepper, Macedonian parſley ſeed, olibanum, Chio turpentine, wild valerian root, each ſix drams:—gentian root; celtic nard; ſpignel; leaves of poley mountain, St John's wort, groundpine; germander tops, with the ſeed; carpobalſam, or (in its ſtead) cubebs; aniſeed; ſweet-fennel ſeed; leſſer-cardamom ſeeds, huſked; ſeeds of biſhops-weed, hartwort-treacle, muſtard; hypociſtis; acacia, or (in its ſtead) Japan earth; gum arabic; ſtorax ſtrained; ſagapenum ſtrained; terra Lemnia, or (in its ſtead) bole armenic or French bole; green vitriol calcined; each half an ounce:—ſmall or (in its ſtead) the long birthwort root; leſſer centaury tops; Candy carrot ſeed; opopanax; galbanum ſtrained; Ruſſia caſtor; Jews pitch, or (in its ſtead) white amber prepared; calamus aromaticus; each two drams:—clarified honey, thrice the weight of all the other ingredients. Let theſe ingredients be mixed together, after the ſame manner as directed in making the mithridate.

Theſe celebrated electuaries are almoſt the only remains, which the late reformation has left in the ſhops, of the wild exuberance of compoſition, which the ſuperſtition of former ages brought into vogue. The theriaca is a reformation of mithridate, made by Andromachus, phyſician to Nero: the mithridate itſelf is ſaid to have been found in the cabinet of Mithridates king of Pontus. The firſt publiſhers of this pompous arcanum were very extravagant in their commendations of its virtues; the principal of which was made to conſiſt in its being a moſt powerful preſervative againſt all kinds of venom; whoever took a proper quantity in a morning, was inſured from being poiſoned during that whole day: this was confirmed by the example of its ſuppoſed inventor; who, as Celſus informs us, was, by its conſtant uſe, ſo fortified againſt the commonly-reputed poiſons, that none of them would have any effect upon him when he wanted their aſſiſtance. But the notions of poiſons which prevailed in thoſe ruder ages, were manifeſtly erroneous. Before experience had furniſhed mankind with a competent knowledge of the powers of ſimples they were under perpetual alarms from an apprehenſion of poiſons, and buſied themſelves in contriving compoſitions which ſhould counteract their effects, accumulating together all thoſe ſubſtances which they imagined to be poſſeſſed of any degree of alexipharmic power. Hence proceed the voluminous antidotes which we meet with in the writings of the ancient phyſicians: yet it does not appear that they were acquainted with any real poiſon, except the cicuta, aconitum, and bites of venomous beaſts; and to theſe they knew of no antidote whatever. Even admitting the reality of the poiſons, and the efficacy of the ſeveral antidotes ſeparately, the compoſitions could no more anſwer the purpoſes expected from them, than the accumulating of all the medicinal ſimples into one form could make a remedy againſt all diſeaſes.

Yet notwithſtanding the abſurdity in the original intention of theſe medicines, and their enormity in point of compoſition, as they contain ſeveral powerful materials, whoſe virtues, though greatly prejudiced, yet are not deſtroyed, by their multiplicity and contrariety; the compounds have been found, from repeated experience, to produce very conſiderable effects, as warm opiate diaphoretics.

The college of Edinburgh, paying very little deference to antiquity or common prejudice, ventured at length to diſcard theſe venerable reliques; and ſubſtituted in their room an elegant and ſimple form, equivalent to them both in efficacy, under the title of

903, c. *Edinburgh theriaca.*

Take of Virginian ſnake-root, ten ounces; contrayerva root, ſix ounces; reſin of guaiacum, four ounces; leſſer cardamom ſeeds, two ounces; myrrh, Engliſh ſaffron, opium, each one ounce; rob of elderberries, thrice the weight of the powders; Canary wine, as much as is ſufficient to diſſolve the opium. Make them according to art into an electuary.

This compoſition conſiſts of very powerful ingredients, and is doubtleſs capable of anſwering every thing that can be reaſonably expected from the more voluminous theriaca of Andromachus. The London college alſo had formerly their theriaca, compoſed of the leſs exceptionable ingredients of Andromachus's. But as theſe medicines have for a long time been chiefly employed for external purpoſes, by way of cataplaſm, the London theriaca is now omitted; and its place ſupplied by a cataplaſm compoſed of a few well-choſen articles, under the name of *cataplaſma e cymino*, or "cataplaſm of cummin." For internal uſe, none of the theriacas are at preſent ſo much regarded as they have been heretofore; practitioners having introduced in their room extemporaneous boluſes of Virginian ſnakeroot, camphor, contrayerva, and the like; which anſwer all their intentions, with this advantage, that they may be given either with or without opium, an ingredient which renders the others prejudicial in caſes where they might otherwiſe be proper. The preſent edition of the Edinburgh pharmacopœia has alſo rejected the *theriaca Edinenſis*, and in its room adopted the following compoſition under the title of

903, d. *Thebaic electuary.*

Take of aromatic ſpecies, ſix ounces; Virginian ſnakeroot in powder, three ounces; opium diſſolved in white-wine, three drams; clarified honey, thrice the weight of the powders. Mix all together into an electuary.

904. *London philonium.*

Take of white pepper, ginger, caraway ſeeds, each two ounces; ſtrained opium, ſix drams; ſyrup of meconium, boiled to the conſiſtence of honey, thrice the weight of the other ingredients. Heat the ſyrup, and carefully mix it with the opium, previouſly diſſolved in wine; then add the other ingredients, reduced into powder. *L.*

This is a reformation of the *philonium* deſcribed by Galen, which was received in our preceding pharmacopœias with the addition of ſome ſuperfluous ingredients, and diſtinguiſhed, but not very properly, by the epithet *Romanum*. The additional articles, and ſome unneceſſary ones that were in the original, are here omitted, and the quantities of the others varied, ſo as to preſerve the ſame proportion of opium to the whole, as in the laſt L. pharmacopœia. Thirty-ſix grains of the compoſition contain one grain of opium.

905. The mithridate, theriaca, diaſcordium, confectio Paulina, and philonium, are the only compoſitions now remaining, of what have been called the *officinal capitals*. They are all medicines of great power: and as, on the one hand, they are applicable, by the judicious phyſician, to excellent purpoſes; ſo, on the other, their imprudent uſe has often been productive of miſchievous conſequences. It has been cuſtomary among nurſes and others, to give diaſcordium to children, to eaſe their complaints, and to procure ſleep: intentions which it effectually anſwers; but at the ſame time never fails to bring on a coſtive habit, the foundation of many diſeaſes: this medicine has likewiſe been too unwarily given for reſtraining fluxes; whoſe ſuppreſſion was afterwards followed by more dangerous ſymptoms. The celebrated alexipharmacs, mithridate and theraica, have oftentimes aggravated the diſorders they were intended to remedy, have converted a common cold into a high fever, and have raiſed ſlight febrile complaints into a malignant fever. However ſtrongly, therefore, theſe kinds of medicines are recommended for eaſing pain, warming, promoting ſweat, expelling malignity, &c. the utmoſt caution is requiſite in the uſe of them; the caſes which demand their aſſiſtance are much leſs frequent than is generally ſuppoſed.

906. *Acid electuary.*

Take of conſerve of wood-ſorrel, one ounce; pulp of tamarinds, half an ounce; weak ſpirit of vitriol, as much as is ſufficient to give a grateful acidity: ſyrup of lemon-juice, as much as will reduce the whole into the conſiſtence of a ſoft electuary.

This grateful acid compoſition is an uſeful refrigerant and antiſeptic in different kinds of inflammatory and putrid diſorders.

907. *Alexeterial electuary.*

Take of confection of kermes, one dram; candied ginger, ſix drams; contrayerva root, Virginian ſnakeroot, each one dram; ſyrup of orange-peel, as much as is ſufficient to make the other ingredients into the conſiſtence of an electuary.

This is a moderately warm electuary, contrived by Boerhaave for raiſing and recruiting the ſtrength in low fevers, where the pulſe is ſunk, and the patient languid and dejected. It may be taken to the quantity of a ſmall nutmeg every four or five hours, with any proper julep.

908. *Anti-epileptic electuary.*

Take of Peruvian bark, one ounce; wild valerian root, two drams; ſyrup of orange-peel, a ſufficient quantity to reduce the others into an electuary.

This medicine has been frequently preſcribed by Dr Mead, in epileptic caſes, with ſucceſs: he directs one dram to be taken every morning and evening, for three months together; after which, to confirm the cure and prevent a relapſe, the ſame doſe is to be repeated for three or four days before every new and full moon for a conſiderable time.

909. *Anti-dyſenteric electuary.*

Take of yellow wax, three drams; ſpermaceti, two drams; conſerve of red roſes, an ounce and a half; oil of almonds, half an ounce; balſamic ſyrup, a ſufficient quantity. Let the wax and ſpermaceti be melted in the oil, over a gentle fire, and then mixed with the conſerve and ſyrup.

Where ſharp irritating humours have eroded the inteſtines, and laid open the mouths of the blood-veſſels, this ſoft healing electuary is often of great uſe. It is ſaid that fluxes of long ſtanding, contracted in the Indies, which had yielded nothing to medicines of the reſtringent kind, have been removed by this, which ſupplies the natural mucus of the bowels that the flux has carried off, heals the excoriations, and obtunds the acrimonious humours.

910. *Aromatic electuary.*

Take of the aromatic ſpecies, one dram and a half; conſerve of lavender, two ounces; ſyrup of orange-peel, a ſufficient quantity. Make them into an electuary.

This warm cordial medicine is of uſe in nervous complaints and decays of conſtitution. The bulk of a ſmall nutmeg may be taken two or three times a-day with a glaſs of wine or any other proper liquor after it.

911. *Balſamic electuary.*

Take of conſerve of roſes, two ounces; Locatelli's balſam, one ounce; diſſolve the balſam in the yolk of an egg, and then mix therewith the conſerve.

This electuary is uſed in ſome coughs, and diſorders of the breaſt; as alſo in the vomica, or ſuppuration in the ſtomach, which ſometimes happens after dyſenteries; and where there is an eroſion or rupture of the blood-veſſels, as in hæmoptöes. In theſe caſes, the bulk of a nutmeg may be taken for a doſe twice or thrice a-day.

912. *Chalybeate electuary.*

1. Take of ſalt of ſteel, one dram; candied nutmegs, candied ginger, each half an ounce; oil of cinnamon, five drops; conſerve of orange-peel, one ounce; balſamic ſyrup, as much as is ſufficient to make them into an electuary.
2. Take of ruſt of ſteel, or ſteel prepared with ſulphur, ſix drams; candied ginger, one ounce; conſerve of orange-peel, three ounces; ſyrup of orange-peel, as much as will reduce them into a proper conſiſtence.

Theſe elegant chalybeate medicines are given not only in cachectic and chlorotic caſes, and menſtrual obſtructions, but likewiſe in low hyſteric and melancholic diſorders; and for warming and invigorating the habit in great debilities and decays of conſtitution. In either of theſe intentions, the bulk of a ſmall nutmeg is to be taken twice a-day, and its effects promoted by moderate exerciſe.

913. *Electuary of black hellebore.*

Take of black hellebore root, extract of ſavin, compound powder of myrrh, each half an ounce; canella alba, two drams; ſyrup of orange-peel, as much as is ſufficient. Mix, and make them into an electuary.

This is a medicine of great power for promoting the natural evacuations from the uterus. It may be taken to the quantity of half a dram twice a-day.

914. *Nephritic electuary.*

Take of lenitive electuary, an ounce and a half; Venice turpentine, one ounce; egg-ſhells prepared (or prepared oyſterſhells) half an ounce; choice rhubarb, one dram; ſyrup of marſhmallows, as much as is ſufficient. Diſſolve the turpentine in the yolk of an egg; and then mix the whole together, according to art, ſo as to make thereof an electuary.

This compoſition is contrived for cleanſing the urinary paſſage in nephritic diſorders. A dram of the electuary may be taken once or twice a-day, along with an infuſion of marſhallow roots, ſweetened with a ſpoonful of honey.

915. *Paralytic electuary.*

Take of muſtard ſeed, conſerve of roſemary tops, each one ounce; compound ſpirit of lavender, two drams. Beat the muſtard ſeed with a little water, that the pulp may be preſſed thro' a hair ſieve; then mix with it the conſerve and the ſpirit.

This is a very efficacious medicine for paralytic diſorders, tremors and numbneſs of the limbs, the decays accompanying old age, and in all caſes where the ſolids require to be ſtimulated, or ſluggiſh ſtagnant juices to be put in motion. It ought to be taken every morning and evening, or oftener, to the bulk of a large nutmeg, with a glaſs of rich wine, or any proper julep, after it.

916. *Electuary of Peruvian bark.*

1. Take of Peruvian bark, three ounces; caſcarilla, half an ounce; ſyrup of orange-peel, a ſufficient quantity.
2. Take of Peruvian bark, three ounces; Virginian ſnakeroot, one ounce; ſyrup of orange peel, a ſufficient quantity.
3. Take of Peruvian bark, three ounces; crude ſal ammoniac, three drams; ſyrup of lemon-juice, a ſufficient quantity.
4. Take of Peruvian bark, three ounces; colcothar of vitriol, ſix drams; ſimple ſyrup, a ſufficient quantity.
5. Take of Peruvian bark, three ounces; alum, one ounce; ſyrup of lemon-juice, as much as is ſufficient.
6. Take of extract of Peruvian bark, one ounce; extract of logwood, extract of liquorice, each half an ounce; mucilage of quince-ſeeds, as much as is ſufficient to reduce the other ingredients into the conſiſtence of an electuary.

All theſe compoſitions are very elegant, and efficacious in the intentions for which they are deſigned. The firſt is calculated for common intermittent fevers, in the cure of which the virtues of the bark are greatly aſſiſted by the caſcarilla. The ſecond and third are given in thoſe intermittents which happen in cachectic habits, and perſons ſubject to obſtructions of the viſcera, where the bark by itſelf, on account of its great aſtringency,

gency, would be prejudicial. The fourth is a good ſtrengthener in laxities of the ſolids and decays of conſtitution; and the fifth, a powerful ſtyptic in fluxes and hæmorrhages, particularly in the diabetes and fluor albus. The bulk of a nutmeg of each may be taken at a time, and repeated according to the exigency of the caſe. The ſixth is a very agreeable form for the exhibition of Peruvian bark to thoſe who are more than ordinarily offended with its taſte; the ſubſtances here joined effectually covering its taſte, at the ſame time that they coincide with it in virtue. The compoſition is a very elegant and pleaſant one, and well deſerves a place in the ſhops: it may either be given in the form of a bolus or electuary, in the doſe of a dram or more; or diſſolved in any ſuitable liquor into a draught.

917. *An acid purgative electuary.*

Take of pulp of tamarinds, two ounces; cryſtals of tartar, two drams. Make them into an electuary.

This is an uſeful cooling laxative in hot bilious diſpoſitions, or inflammatory diſeaſes. The bulk of a nutmeg may be taken every hour, or oftener, till it begins to operate, or the ſame quantity may be taken once a day occaſionally in dry coſtive habits.

918. *Saponacecus electuary.*

Take of hard Spaniſh ſoap, two ounces; pareira brava, one ounce; rhubarb, gum of aloes, each three drams; ſyrup of orange-peel, a ſufficient quantity. Mix and make them into an electuary.

This electuary is calculated for jaundices ariſing from an obſtruction of the biliary ducts, or a viſcidity of the bile itſelf: ſuch are thoſe which moſt commonly occur, in which the ſtools are of a whitiſh or aſh-colour, and voided with difficulty. The doſe is from half a dram to a dram, twice a day.

919. *Binding electuary.*

Take of the Japonic confection, two ounces; extract of logwood, one ounce; ſyrup of dry roſes, as much as will reduce them into a proper conſiſtence for an electuary.

This electuary is calculated for the relief of dyſenteries, and other inteſtinal fluxes, after the acrid humours have been duly evacuated by mild cathartics, &c. The quantity of a nutmeg may be taken every four or five hours.

920. *Electuary of ſulphur.*

Take of flowers of ſulphur, half an ounce; lenitive electuary, two ounces; ſyrup of marſhmallows, a ſufficient quantity to make them into an electuary.

This electuary is deſigned againſt the piles, and generally diſtinguiſhed in the hoſpitals by the title of *electuarium hæmorrhoidale:* where the diſorder is accompanied with febrile or inflammatory ſymptoms, ſome nitre is occaſionally added, in the proportion of two drams to the quantity here directed. It may be given from a dram to half an ounce at a time.

SECT. VI. *Lohochs.*

921. A LOHOCH, eclegma, linctus, or lambative, is a ſoft compound deſigned to be licked or ſlowly ſwallowed down, of a middle conſiſtence between a ſyrup and electuary, at leaſt never ſo thin as the former, nor ſo thick as the latter.

Theſe preparations are generally compoſed of expreſſed oils, mixed with ſyrups and other like ſubſtances. Two ounces of a ſyrup, a dram of ſugar, and an ounce of expreſſed oil, form a linctus of a due conſiſtence; which may be made thicker at pleaſure by adding more oil, or thinner by an increaſe of the ſyrup.

The form is an inelegant one, and in the preſent practice is little regarded.

SECT. VII. *Emulſions.*

922. THE foregoing ſection reſpected compoſitions in which oils were united with watery liquors, by the mediation of ſugar and ſyrups, into thick unctuous compounds. The preſent ſection contains mixtures of oily, reſinous, and other like bodies, with water, in a liquid form, of a white colour reſembling milk, and hence called *emulſions.*

Emulſions have been generally prepared by grinding the oily ſeeds of plants, or kernels of fruits, along with common water or any agreeable ſimple diſtilled water. In this proceſs, the oil of the ſubject is, by the the mediation of the other matter, united with the aqueous fluid: and hence they poſſeſs ſome ſhare of the emollient virtue of the pure oil; with this advantage, that they are agreeable to the palate, and not apt to turn rancid or acrimonious by the heat of the body, which the pure oils in ſome inflammatory caſes may do.

Emulſions, beſides their uſe as medicines themſelves, are excellent vehicles for certain ſubſtances which cannot otherwiſe be ſo conveniently taken in a liquid form. Thus camphor triturated with almonds, readily unites water into an emulſion, and in this form is conveyed into the remoteſt parts of the body, with ſufficient efficacy to anſwer intentions of moment, at the ſame time that its heat and pungency are ſoftened by the unctuoſity of the almonds.

Pure oils, balſams, reſins, and other ſimilar ſubſtances, are likewiſe rendered miſcible with water, into emulſions or milky liquors, by the intervention of mucilages. The white or yolk of an egg unites theſe bodies alſo with water, but leſs elegantly.

Several of the gummy reſins, as ammoniacum, galbanum, myrrh, and others, are reducible to emulſions by trituration with water alone; their reſinous part being rendered diſſoluble by the mediation of the gummy.

923. *Common emulſions.*

Take of ſweet almonds blanched, one ounce; gum arabic, half an ounce; double-refined ſugar, ſix drams; barley water, two pints. Diſſolve the gum in the barley water warmed; as ſoon as the water is grown thoroughly cold, pour it by little at a time upon the almonds and ſugar, firſt beat together, continuing to grind the whole, that the liquor may grow milky; after which it is to be paſſed through a ſtrainer. *L.*

Take of ſweet almonds, one ounce; bitter almonds, one dram; common water, two pints. Beat the almonds, after having blanched them, in a marble mortar, end gradually pour on them the common water. Then ſtrain off the liquor. *E.*

924. *Arabic emulſion* is made after the ſame manner,

by adding, while the almonds are beating, two ounces and a half of mucilage of gum arabic.

Great care ſhould be taken that the almonds are not become rancid by keeping; which will not only render the emulſion extremely unpleaſant, a circumſtance of great conſequence in a medicine that requires to be taken in large quantities, but likewiſe give it injurious qualities little expected from preparations of this claſs. Theſe liquors are principally made uſe of for diluting and obtunding acrimonious humours; particularly in heat of urine and ſtranguries, ariſing either from a natural ſharpneſs of the juices, or the operation of cantharides or other irritating medicines: in theſe caſes, they are to be drank frequently, in the quantity of half a pint or more at a time.

925. *A purging emulſion.*

Take of ſweet almonds blanched, two drams; fine ſugar, one dram; gum arabic, half a dram; ſcammony, 10 grains; ſimple cinnamon-water, one ounce. Diſſolve the gum in the cinnamon water; and having ground the ſcammony with almonds and ſugar, pour on the liquor by little at a time, continuing to grind them together, ſo as to make them into an emulſion.

This emulſion is an agreeable and effectual purgative. Some have employed an infuſion of liquorice; which appears to be a very proper addition in theſe kinds of preparations, as it coincides with the almonds in correcting the irritating power of the purgative material.

926. *Emulſion with arum root.*

Take of freſh arum root, gum arabic, each two drams; ſpermaceti, two ſcruples; common water, five ounces; nutmeg-water, ſyrup of orange-peel, each half an ounce. Diſſolve the gum arabic with a part of the water, into a mucilage, which is to be beaten with the ſpermaceti into a ſmooth paſte. To this add the arum root, previouſly beaten by itſelf into a pulp; and rub them well together, that they may be thoroughly mixed. Then gradually pour in the waters and the ſyrup.

Freſh arum root may be taken in this form without the leaſt inconvenience from the pungency with which the root itſelf ſo violently affects the mouth. A ſpoonful of the emulſion has been given every ſix hours, or oftener, in caſes of the rheumatic kind, and generally with great benefit. The more immediate effect experienced from it is that of warming the ſtomach, and promoting ſweat, which in ſome inſtances it does profuſely.

Sect. VIII. *Juleps, Mixtures, and Draughts.*

927. By *julep* is commonly underſtood, an agreeable liquor, deſigned as a vehicle for medicines of greater efficacy, or to be drank after them, or to be taken occaſionally as an auxiliary. In this light their baſis is generally common water, or a ſimple diſtilled water, with one-fourth or one third its quantity of a diſtilled ſpirituous water: this mixture is ſweetened with ſugar or any proper ſyrup, or acidulated with vegetable or mineral acids, or impregnated with other medicines ſuitable to the intention; care being taken that theſe additions be ſuch as will not render the compound unſightly or unpalateable. The quantity uſually directed at a time, in common preſcription, is ſix or eight ounces, to be taken by ſpoonfuls.

928. A *mixture*, more ſtrictly ſo called, receives more efficacious materials, whether ſoluble in water, as extracts or ſalts; or indiſſoluble, as powders; more regard being here had to the medicinal intention, than to the ſightlineſs or palateableneſs of the compound. There is indeed no preciſe diſtinction between the two; the ſame compoſition being often called by one a *julep*, and by another a *mixture;* though in general, few would give the name of *julep* to a very diſagreeable liquor, or that of *mixture* to a very pleaſant one.

929. A *draught* differs from a julep or mixture only in being preſcribed in leſs quantity, the whole being intended for one doſe.

930. *Chalk Julep.*

Take of the whiteſt chalk prepared, one ounce; double-refined ſugar, ſix drams; gum arabic, two drams; water, two pints. Mix them together.

This julep is deſigned for heartburns and other like diſorders ariſing from acid juices in the firſt paſſages.

931. *Muſk julep.* L.

Take of damaſk-roſe water, ſix ounces by meaſure; muſk, 12 grains; double-refined ſugar, one dram. Grind the ſugar and muſk together, and gradually add to them the roſe-water.

This is an improvement upon the *hyſteric julep with muſk of Bates*, formerly in uſe.

932. *Cordial julep.*

Take of alexeterial water, four ounces; aromatic water, two ounces; volatile oily ſpirit, tincture of ſaffron, each two drams; white ſugar, half an ounce. Mix, and make them into a julep.

This mixture is an uſeful cordial in all depreſſions of the ſpirits, in the ſinkings of low fevers, and the languors to which hyſterical and hypochondriacal perſons are ſubject. An ounce, or two ſpoonfuls, may be taken for a doſe, two or three times a day.

933. *Diaphoretic julep.*

Take of alexeterial water, four ounces; ſpirit of Mindererus, two ounces; ſalt of hartſhorn, ten grains; white ſugar, ſix drams. Mix them for a julep.

This excellent compoſition is a very powerful ſudorific, and anſwers its intention more effectually, and with greater certainty, than many others calculated for the ſame purpoſe. Where a copious ſweat is to be excited, as in rheumatic diſeaſes, two ſpoonfuls are to be taken warm in bed every hour, or two hours, till the ſweat breaks out; if warm diluting liquors are not afterwards ſufficient to keep it up, the ſame medicine is to be occaſionally repeated.

934. *Diuretic julep.*

Take of ſpirit of Mindererus, four ounces; compound horſeradiſh water, two ounces; ſyrup of marſhmallows, three ounces. Mix them together.

The ſpirit of Mindererus is an excellent aperient ſaline liquor, capable of promoting evacuation either by the cutaneous pores, or the urinary paſſages, according to the manner of exhibiting it. When taken warm in bed, it proves a powerful ſudorific, eſpecially if aſſiſted by volatile ſalts, ſmall doſes of opiates, or other ſubſtances which tend to determine its action to the ſkin. If the patient walks about in a cool air, it operates gently, but for the moſt part effectually, by urine. The additions here joined to it correſpond with this intention, and promote its operation. As this medicine excites the urinary diſcharge, without heating or irritating the parts, it takes place not only in dropſies, but likewiſe in inflammatory diſorders, wherever this ſalutary ſecretion is to be promoted. It is given in the quantity of two ſpoonfuls thrice a-day.

935. *Fetid julep.*

Take of aſafetida, one dram and a half; rue water, ſix ounces; compound valerian water, two ounces; oil of hartſhorn, twenty drops; white ſugar, ten drams. Rub the aſafetida in the rue water till it diſſolves; and having dropped the oil upon the ſugar, mix the whole together.

This compoſition is not a little fetid and unſightly; it is nevertheleſs a medicine of great efficacy in hypochondriacal and hyſteric diſorders, aſthmas, and other nervous complaints: the doſe is one ſpoonful, to be taken thrice a-day. It is ſometimes prepared without the oil of hartſhorn.

936. *Binding julep.*

Take of alexeterial water, four ounces; aromatic water, two ounces; Japonic confection, two drams; Japan earth, in powder, one dram; liquid laudanum, forty drops; white ſugar, half an ounce. Mix them well together.

This julep is calculated againſt dyſenteries and diarrhœas; in which, after proper evacuations, it generally eaſes the gripes, and reſtrains the flux. It is to be given three or four times a-day, in the quantity of a ſpoonful at a time.

937. *Antidyſenteric mixture.*

1. Take of ſimple cinnamon-water, ſeven ounces; ſpirituous cinnamon-water, one ounce; electuary of ſcordium with opium, half an ounce. Mix them together.

2. Take of extract of logwood, three drams; tincture of Japan earth, two drams; ſpirituous cinnamon-water, one ounce; common water, ſeven ounces. Diſſolve the extract in the cinnamon-water, and then add the common water and the tincture.

In recent dyſenteries, after the neceſſary evacuations, a ſpoonful or two of either of theſe mixtures may be given after every motion, or once in four or five hours: if the firſt, which is a mild opiate, fails of procuring reſt, it is a ſign that ſome of the corrupted humours ſtill remain in the bowels, and that it is more proper to go on with the evacuation than to ſuppreſs the flux. Theſe medicines will ſometimes likewiſe take place in the laſt ſtage of the diſeaſe, when thro' neglect or miſmanagement it has continued till the ſtrength is much impaired, the inteſtines greatly relaxed, and their villous coat abraded; provided there are neither ichorous or involuntary ſtools, aphthæ, petechiæ, hickup, or great anxiety at the breaſt. Rhubarb, and theſe aſtringents, are to be ſo interpoſed, that at the ſame time that the putrid humours are diſlodged, the ſtrength may be ſupported, and the inteſtines braced.

938. *Cordial mixture.*

Take of ſimple cinnamon-water, four ounces; ſpirituous cinnamon-water, two ounces; extract of ſaffron, one ſcruple; confection of kermes, ſix drams. Mix them together.

In great languors and depreſſions, a ſpoonful of this rich cordial mixture may be taken every half hour.

939. *Mixture againſt the phthiſis.*

1. Take of balſam of copaiba, one dram; common water, four ounces; ſpirituous cinnamon-water, one ounce. Syrup of orange-peel, half an ounce. Let the balſam be diſſolved in a proper quantity of yolk of egg, and then mixed with the other ingredients.
2. Take of thebaic extract, one grain; conſerve of roſes, half a dram. Mix them together for a bolus.
3. Take of oxymel of ſquils, a dram and a half; thebaic tincture, fifteen drops; ſpirituous cinnamon-water, two drams; common water, two ounces. Mix them together.

In the advanced ſtate of a conſumption, we may diſtinguiſh two ſorts of coughs, one occaſioned by the ulcers, and the other by a thin rheum falling upon the fauces and trachea; which parts, being then deprived of their mucus, become extremely ſenſible to irritation. It is this laſt kind, perhaps, which is moſt painful and teazing to the patient. The firſt ſort requires balſamics, if the ulcer is open, and the matter can be expectorated. For this purpoſe, the firſt of the above mixtures is a very elegant and effectual formula; two ſpoonfuls are to be taken at a time twice a-day: if the balſam purges, two drams of the paregoric elixir, added to the quantity of the mixture here preſcribed, will prevent that effect. The other kind of cough can only be palliated by incraſſants; and for that purpoſe, the ſecond of the above compoſitions is one of the moſt ſucceſsful medicines: the conſerve is altogether ſafe, and otherwiſe well adapted to the nature of the diſeaſe, but of weak virtues: the opiate extract is the moſt efficacious ingredient, but is to be given with great caution, as opiates in general are apt to heat, to bind the body, and to obſtruct expectoration. As theſe bad qualities are in good meaſure corrected by ſquills, as ſoon as the patient begins to complain of reſtleſs nights from coughing, the third mixture may be given at bed-time.

940. *Valerian mixture.*

Take of ſimple peppermint-water, twelve ounces; wild valerian-root, in powder, one ounce; compound ſpirit of lavender, half an ounce; ſyrup of orange-peel, one ounce. Mix them together.

Wild valerian root, one of the principal medicines in epilepſies and vertigoes, ſeems to anſwer better when thus exhibited in ſubſtance, than if given in form of tincture or infuſion. The liquors here joined to it excellently coincide with, and by their warmth and pungency greatly improve, its virtues. Two ſpoonfuls of the mixture may be taken twice or thrice a-day.

941. *Cathartic draught.*

Take of jalap, in powder, one ſcruple; ipecacoanha, three grains; compound juniper-water, one ounce; infuſion of lintſeed, an ounce and a half; ſimple ſyrup, one dram. Mix them together.

This is a ſtrong cathartic; yet for the moſt part eaſy and ſafe in operation. It is calculated chiefly for hydropic caſes; in which it procures copious evacuations, without weakening or fatiguing the patient ſo much as many other medicines of this kind.

942. *Saline cathartic draught.*

Take of Glauberts cathartic ſalt, manna, each ſix drams; boiling water, three ounces; tincture of cardamons, one dram. Diſſolve the ſalt and manna in the water; and having ſtrained off the liquor, add to it the tincture of cardamoms.

This is a very elegant and agreeable ſaline purgative. Tincture of cardamoms is one of the beſt additions to liquors of this kind, or to the purging mineral waters, for rendering them acceptable to the ſtomach.

943. *Diaphoretic draught.*

Take of ſpirit of Mindererus, ſpirit of meconium, each half an ounce; ſalt of hartſhorn, five grains. Mix them together.

This draught is a very powerful ſaline diaphoretic. It is given with ſafety, and often with great benefit, in the beginning of inflammatory fevers, after bleeding; where theriaca, and other warm ſubſtances uſually employed, if they fail in bringing out a ſweat, increaſe the fever.

944. *Diuretic draught.*

1. Take of oxymel of ſquills, one dram and a half; ſimple cinnamon-water, one ounce; compound ſpirit of lavender, ſyrup of orange-peel, each one dram. Mix them together.
2. Take of vinegar of ſquills, one dram, or one dram and a half; ſalt of wormwood, half a dram; lemon-juice, ſix drams; ſimple cinnamon-water, an ounce and a half; ſpirituous peppermint-water, half an ounce; ſyrup of orange-peel, one dram. Let the ſalt of wormwood and lemon-juice be firſt mixed together, and then add to them the other ingredients.

Theſe elegant and efficacious compoſitions are commended by Dr Mead for promoting urine in hydropic caſes. He directs them to be taken every night, or oftener, according to the urgency of the ſymptoms. The ſquill, one of the moſt powerful diuretics, is, by the additions here joined to it, rendered not only more grateful to the palate and ſtomach, but likewiſe enabled more effectually to anſwer the purpoſes intended by it.

945. *An anodyne diuretic draught.*

Take of ley of tartar, half a dram; thebaic tincture, forty drops; peppermint-water, one ounce; ſimple cinnamon-water, half an ounce; ſpirituous cinnamon-water, two drams; ſyrup of marſhmallows, one dram. Mix them together.

Though practitioners have rarely ventured to exhibit opium in dropſies; yet in thoſe which are accompanied with great pain, this anodyne drug, by eaſing the pain, and removing the ſtricture of the paſſages, which painful ſenſations always occaſion, proves a medicine of great ſervice, and notably promotes the urinary diſcharge. Dr Mead has given a remarkable inſtance of the good effects of the mixture above preſcribed, in a perſon labouring under an aſcites and tympany at the ſame time, where the pain was intolerable, the thirſt intenſe, and the urine in very ſmall quantity: the ſtronger purgatives increaſed the diſtemper; ſoap, alkaline ſalts, nitre, and other diuretics, were tried in vain: this draught (when the patient ſeemed to be beyond any aſſiſtance from medicine) procured unexpected relief, not only a gentle ſleep, and truce from the pain, but likewiſe a copious diſcharge of urine: by repeating the medicine for a little time, every eight hours, and afterwards uſing corroborants, the cure was perfectly completed.

Sect. IX. *Lotions, Gargariſms, Injections,* &c.

946. *Bates's alum water.* L.

Take of alum, white vitriol, each half an ounce; water, two pints. Boil the ſalts in the water till they are diſſolved; let the ſolution ſettle, and afterwards filter it through paper.

This liquor is uſed for cleanſing and healing ulcers and wounds, and for removing cutaneous eruptions, the part being bathed with it hot three or four times a-day. It is ſometimes likewiſe employed as a collyrium; and as an injection in the gonorrhœa and fluor albus, when not accompanied with virulence.

947. *Alum water.* E.

Take of corroſive mercury ſublimate, alum, each two drams; water, two pints. Let the ſublimate and alum be ground into powder, and boiled with water in a glaſs veſſel to the conſumption of half the water; then ſuffer the liquor to ſettle, and pour it off clear from the ſediment.

This compoſition is deſigned chiefly for cutaneous puſtules and ulcerations.

948. *Sapphire-coloured water.*

Take of lime-water, one pint; ſal ammoniac, one dram. Let them ſtand together in a copper veſſel, or along with ſome plates of copper, until the liquor has acquired a ſapphire colour. *L.*

Take of lime-water newly made, half a pint; ſal ammoniac, two ſcruples; powdered verdigreaſe, four grains. Mix and ſtrain after 24 hours. *E.*

This water is at preſent pretty much in uſe, as a detergent of foul and obſtinate ulcers, and for taking away ſpecks or films in the eyes.

949. *Blue vitriolic water.* L.

Take of blue vitriol, three ounces; alum, ſtrong ſpirit (or oil) of vitriol, each two ounces; water, a pint and a half. Boil the ſalts in the water, until they are diſſolved; then add the acid ſpirit, and filter the mixture through paper.

950. *Styptic water.* E.

Take of blue vitriol, alum, each three ounces; water, two pints. Boil them until the ſalts are diſſolved, then filter the liquor, and add an ounce of oil of vitriol.

Theſe compoſitions are formed upon the ſtyptic recommended by Sydenham, for ſtopping bleeding at the noſe, and other external hæmorrhages: for this purpoſe, cloths or doſſils are to be dipt in the liquor, and applied to the part.

951. *Vitriolic water.* E.

Take of white vitriol, two drams; water, two pints. Boil till the vitriol is diſſolved, and then filter the liquor.

Where the eyes are watery or inflamed, this ſolution of white vitriol is a very uſeful application: the ſlighter inflammations will frequently yield to this medicine, without any other aſſiſtance; in the more violent ones, venæſection and cathartics are to be premiſed to its uſe.

952. *Aſtringent gargariſm.*

Take of oak-bark, one ounce; alum, one dram; honey of roſes, one ounce; water, a pint and a half. Boil the water with the oak-bark, till ſuch time as the liquor, when ſtrained, will amount only to one pint; to which add the alum and the honey.

953. *Common gargariſm.*

Take of tincture of roſes, one pint; honey of roſes, two ounces. Mix them together. Or,

Take of water, ſix ounces; nitre, one dram; honey of roſes, one ounce. Mix them together. Where acids are requiſite, forty drops of the weak ſpirit of vitriol are added to this compoſition.

954. *Detergent gargariſm.*

Take of emollient decoction, one pint; tincture of myrrh, one ounce; honey, an ounce and a half. Mix them together.

955. *Emollient gargariſm.*

Take of marſhmallow root, two ounces; figs, four in number; water, three pints. Boil them till one pint is waſted, and then ſtrain the liquor.

Theſe liquors are uſed for waſhing the mouth and fauces; the firſt, where the parts are extremely relaxed; the ſecond and third, where ulcerations require to be deterged, or the excretion of the thick viſcid ſaliva promoted; and the fourth, where the mouth is dry, parched and rigid, to moiſten and ſoften it. In ſome caſes, volatile ſpirits may be advantageouſly joined to theſe kinds of preparations. Dr Pringle informs us, that in the inflammatory quinſey, or ſtrangulation of the fauces, he has obſerved little benefit ariſing from the common gargles: that ſuch as were of an acid nature ſeemed to do more harm than good, by contracting the emunctories of the ſaliva and mucus, and thickening thoſe humours: that a decoction of figs in milk and water ſeemed to have a contrary effect, eſpecially if ſome ſpirit of ſal ammoniac was added, by which the ſaliva was made thinner, and the glands brought to ſecrete more freely; a circumſtance always conducive to the cure.

956. *Starch glyſter.*

Take of gelly of ſtarch, four ounces; linſeed oil, half an ounce. Liquefy the gelly over a gentle fire, and then mix in the oil. Forty drops of liquid laudanum, are ſometimes added.

957. *Anodyne* or *opiate glyſter.*

Take of infuſion of linſeed, ſix ounces; liquid laudanum, forty drops. Or,

Mutton-broth, five ounces; thebaic extract, three grains.

958. *Glyſter againſt the colic.*

Take of common decoction, half a pint; tinctura ſacra, one ounce; common ſalt, one dram; linſeed oil, two ounces. Mix them together.

959. *Aſtringent glyſter.*

Take of lime-water, ten ounces; Japonic confection, half an ounce. Mix them together for a glyſter, of which one half is to be injected at a time.

960. *Aſtringent balſamic glyſter.*

This is made by adding to the foregoing half an ounce of Locatelli's balſam, diſſolved in the yolk of an egg.

961. *Common glyſter.*

Take of common decoction, twelve ounces; lenitive electuary, one ounce; common ſalt, half an ounce; oil-olive, two ounces. Mix them together.

962. *Domeſtic glyſter.*

Take of cows milk, half a pint; brown-ſugar, oil-olive, each one ounce. Mix them together.

963. *Emollient glyſter.*

Take of palm-oil, an ounce and a half; cows milk, half a pound. Let the oil be beat up with the yolk of one egg, and then add the milk.

964. *Fetid glyſter.*

Take of aſafetida, two drams; rue, ſavin, each half an ounce; oil-olive, one ounce; oil of Amber, half a dram; water, one pint and a half. Boil the water with the rue and ſavin, till half a pint is waſted; then ſtrain off the remaining decoction, and mix with it the aſafetida and the oils. Half the quantity of the compoſition here directed, is to be injected at a time.

965. *Purging glyſter.*

Take of common decoction, half a pint; white ſoap, one ounce; ſyrup of buckthorn, an ounce and a half. Mix them together.

966. *Turpentine glyſter.*

Take of common decoction ten ounces; Venice turpentine (diſſolved in the yolk of an egg), half an ounce; linſeed oil, one ounce. Mix them together.

The uſes of theſe compoſitions are ſufficiently obvious from their titles. The ſtarch, anodyne, emollient, and aſtringent glyſters, are uſed in dyſenteries, and other alvine fluxes, to ſtrengthen the tone of the inteſtines, defend them from being corroded by the acrimonious humours, to heal their exulcerations, and eaſe the pains which accompany theſe diſorders. The turpentine glyſter is injected in nephritic caſes; the fetid in hyſteric ones. The others are calculated for unloading the inteſtines of their contents, where the exhibition of purgatives in other forms is improper or unſafe.

Glyſters have been looked upon by ſome as mere topical applications, whoſe operation was confined to the inteſtines, into which they are received. But experience has ſhewn, that in many caſes their action is extended much farther: thus the turpentine glyſter, above deſcribed, promotes the diſcharge by the kidneys, and communicates to the urine a violet ſmell; and the anodyne glyſter proves narcotic, as if a moderate doſe of opium had been ſwallowed: Perſons have been inebriated by ſpirituous glyſters; and ſome affirm, that life has been ſupported for ſeveral days, by thoſe of a nutritious kind.

967, *Balſamic injection.*

Take of balſam of Copaiba, half an ounce; lime-water, ſix ounces; honey of roſes, two ounces. Let the balſam be well beaten up with the yolk of one egg; and then gradually add the lime-water and honey.

968. *Mercurial injection.*

Take of quickſilver, balſam of Copaiba, each half an ounce; roſe-water, half a pint. Rub the quickſilver with the balſam, till they are perfectly incorporated; then mix with them the yolk of an egg, and afterwards add the roſe-water.

This and the foregoing preparation are deſigned to be injected into the urethra in virulent gonorrhœas, for cleanſing and deterging the parts.

SECT. X. *Plaſters.*

969. PLASTERS are compoſed chiefly of oily and unctuous ſubſtances, united with powders, into ſuch a conſiſtence, that the compound may remain firm in the cold, without ſticking to the fingers; that it may be ſoft and pliable in a ſmall heat; and that by the warmth of the human body it be ſo tenacious, as readily to adhere both to the part on which it is applied, and to the ſubſtance on which it is ſpread.

There is however a difference in the conſiſtence of plaſters, according to the purpoſes they are to be applied to: thus, ſuch as are intended for the breaſt and ſtomach, ſhould be very ſoft and yeilding; whilſt thoſe deſigned for the limbs are made firmer and more adheſive. An ounce of expreſſed oil, an ounce of yellow wax, and half an ounce of any proper powder, will make a plaſter of the firſt conſiſtence; for a hard one, an ounce more of wax, and half an ounce more of powder, may be added. Plaſters may likewiſe be made of reſins, gummy-reſins, &c. without wax, eſpecially in extemporaneous preſcription: for officinals, theſe compoſitions are leſs proper, as they ſoon grow too ſoft in keeping, and fall flat in a warm air.

Calces of lead, boiled with oils, unite with them into a plaſter of an excellent conſiſtence, and which makes a proper baſis for ſeveral other plaſters.

In the boiling of theſe compoſitions, a quantity of water muſt be added, to prevent the plaſter from burning and growing black. Such water, as it may be neceſſary to add during the boiling, muſt be previouſly made hot: for cold liquor would not only prolong the proceſs, but likewiſe occaſion the matter to explode, and be thrown about with violence, to the great danger of the operator: this accident will equally happen upon the addition of hot water, if the plaſter is extremely hot.

970. *Anodyne plaſter.* E.

Take of white reſin, eight ounces; tacamahaca in powder, galbanum, each four ounces; cummin ſeeds, three ounces; black ſoap, four ounces. Melt the reſin and the gums together; then add the powdered ſeeds and the ſoap, and make the whole into a plaſter.

This plaſter generally gives eaſe in ſlight rheumatic pains, which it is ſuppoſed to effect by preventing the afflux of humours to the part, and putting in motion and repelling ſuch as already ſtagnate there.

971. *Antihyſteric plaſter.* E.

Take of ſtrained galbanum, one pound; ſtrained aſafetida, yellow wax, of each half a pound; yellow reſin, three ounces. Melt them together into a plaſter.

This plaſter is applied to the umbilical region, or over the whole abdomen, in hyſteric caſes, and ſometimes with good effect.

972. *Drawing plaſter.* L.

Take of yellow reſin, yellow wax, each three pounds; tried mutton-ſuet, one pound. Melt them together, and whilſt the maſs remains fluid, paſs it through a ſtrainer.

This is a very well contrived plaſter for the purpoſe expreſſed in its title. It is calculated to ſupply the place of melilot plaſter; whoſe great irritation, when employed for the dreſſing of bliſters, has been continually complained of. This was owing to the large quantity of reſin contained in it, which is here for that reaſon retrenched. It ſhould ſeem, that, when deſigned only for dreſſing bliſters, the reſin ought to be entirely omitted, unleſs where a continuance of the pain and irritation excited by the veſicatory is required. Indeed plaſters of any kind are not very proper for this purpoſe: their conſiſtence makes them ſit uneaſy, and their adheſiveneſs renders the taking them off painful. Cerates, which are ſofter and leſs adheſive, appear much more eligible: the *white cerate* (n° 1019.) will ſerve for general uſe, and for ſome particular purpoſes the *yellow cerate* (n° 1030.) may be applied.

973. *Wax plaſter.* E.

Take of yellow wax, two pounds; white reſin, half a pound; hog's lard, one pound. Melt them together into a plaſter.

This plaſter is ſimilar to the foregoing, but the further reduction of the reſin renders it for ſome purpoſes more eligible.

974. *Cephalic plaſter.*

Take of Burgundy pitch, two pounds; ſoft labdanum, one pound; yellow reſin, yellow wax, each four ounces; the expreſſed oil, called *oil of mace*, one ounce. Melt the pitch, reſin, and wax, together; then add, firſt the labdanum, and afterwards the oil of mace. *L.*

Take of tacamahaca in powder, yellow wax, Venice turpentine, each four ounces; oil of lavender, two drams; oil of amber, one dram. Melt the tacamahaca with the wax; and then add the turpentine, that a plaſter may be formed: when this compound is taken from the fire, and grown almoſt cold, mix in the oils. *E.*

Theſe plaſters are applied, in weakneſs or pains of the head, to the temples, forehead, &c. and ſometimes likewiſe to the feet. Schulze relates, that an inveterate rheumatiſm in the temples, which at times extended to the teeth, and occaſioned intolerable pain, was completely cured in two days by a plaſter of this kind (with the addition of a little opium) applied to the part, after many other remedies had been tried in vain: he adds, that a large quantity of liquid matter exuded, under the plaſter, in drops, which were ſo acrid as to corrode the cuticle.

975. *Common plaſter, uſually called* diachylon.

Take of oil-olive, one gallon; litharge, ground into a moſt ſubtle powder, five pounds. Boil them over a gentle fire, with about two pints of water; keeping them continually ſtirring, till the oil and litharge unite, and acquire the conſiſtence of a plaſter. If all the water ſhould be conſumed before this happens, add ſome more water, previouſly made hot. *L. E.*

This plaſter is the common application in excoriations of the ſkin, ſlight fleſh wounds, and the like. They keep the part ſoft, and ſomewhat warm, and defend it from the air, which is all that can be expected in theſe caſes from any plaſter. Some of our induſtrious medicine-makers have thought theſe purpoſes might be anſwered by a cheaper compoſition, and accordingly have added a large quantity of common whiting and hogs lard; this, however, is by no means allowable, not only as it does not ſtick ſo well, but likewiſe as the lard is apt to grow rancid and acrimonious. The counterfeit is diſtinguiſhable by the eye.

976. *Common ſticking plaſter.*

Take of common plaſter, three pounds; yellow reſin, half a pound. Melt the common plaſter over a very gentle fire; then add the reſin, firſt reduced into powder, that it may melt the ſooner; and mix them all together.

This plaſter may otherwiſe be made, by taking, inſtead of the common plaſter, its ingredients oil and litharge, and adding the reſin a little before they have come to the due conſiſtence; then continue the boiling, till the plaſter is finiſhed. It turns out the moſt elegant when made by this laſt method.

977. *Sticking plaſter.* E.

Take of common plaſter, two pounds; yellow reſin, five ounces. Melt them together, ſo as to make a plaſter.

Theſe plaſters are uſed chiefly as adheſives, for keeping on other dreſſings, &c.

978. *Common plaſter, with gums.* L.

Take of common plaſter, three pounds; galbanum ſtrained, eight ounces; common turpentine, frankincenſe, each three ounces. Melt the galbanum with the turpentine over a gentle fire, and ſprinkle in the frankincenſe reduced to powder: then gradually mix with theſe the common plaſter, previouſly liquefied by a very gentle heat. Or, inſtead of the common plaſter already made, you may take the oil and litharge boiled together: as ſoon as theſe unite, before they have acquired the conſiſtence of a plaſter, the other ingredients are to be added.

979. *Gum plaſter.* E.

Take of gum ammoniacum ſtrained, galbanum ſtrained, each three ounces; common plaſter, two pounds. Mix them together into a plaſter.

Both theſe plaſters are uſed as digeſtives and ſuppuratives; particularly in abſceſſes, after a part of the matter has been maturated and diſcharged, for ſuppurating or diſcuſſing the remaining hard part.

980. *Cummin plaſter.* L.

Take of Burgundy pitch, three pounds; yellow wax, cummin ſeeds, caraway ſeeds, bay-berries, each three ounces. Melt the pitch with the wax; then ſprinkle in the other ingredients firſt reduced into a powder, and mix the whole well together.

This plaſter ſtands recommended as a moderately warm diſcutient; and is directed by ſome to be applied to the hypogaſtric region, for ſtrengthening the viſcera, and expelling flatulencies.

981. *Defenſive plaſter.* E.

Take of common plaſter, two pounds; yellow wax, yellow reſin, of each three ounces; colcothar of vitriol, ſix ounces. Boil the oil with the litharge, till they have acquired nearly the conſiſtence of a plaſter: in this liquefy the wax, and then add the other ingredients, ſo as to form the whole into a plaſter, according to art.

This plaſter is laid round the lips of wounds and ulcers, over the other dreſſings, for defending them from inflammation, and a fluxion of humours; which, however, as Mr Sharp very juſtly obſerves, plaſters, on account of their conſiſtence, tend rather to bring on than to prevent.

982. *Melilot plaſter.*

The London college has ſubſtituted to the plaſter of this name, the *drawing plaſter,* (n° 972.); the Edinburgh the *wax plaſter,* (n° 973.)

983. *Mercurial plaſter.* E.

Take of common plaſter, a pound and a half; quickſilver eight ounces; Venice turpentine, two ounces and a half. Grind the quickſilver in a mortar, with the turpentine, until they are perfectly incorporated; and then, having melted the common plaſter, and taken it from the fire, add to it this mixture.

This plaſter is looked on as a powerful reſolvent and diſcutient, acting with much greater certainty in theſe intentions than any compoſition of vegetable ſubſtances alone; the mercury exerting itſelf in a conſiderable degree, and being ſometimes introduced into the habit in ſuch quantity as to affect the mouth. Pains in the joints and limbs from a venereal cauſe, nodes, tophs, and beginning indurations of the glands, are ſaid ſometimes to yield to them.

984. *Strengthening plaſter.* L.

Take of common plaſter, two pounds; frankincenſe, half a pound; dragons blood, three ounces. Melt the common plaſter, and add to it the other ingredients reduced into powder. The dragons blood ſhould be reduced to a very fine powder, otherwiſe the mixture will not be of an uniform colour.

This is a reformation of the laborious and injudicious compoſition deſcribed in preceding pharmacopœias, under the title of *Emplaſtrum ad herniam;* and though far the moſt elegant and ſimple, is as effectual for that purpoſe as any of the medicines of this kind. If conſtantly worn, with a proper bandage, it will, in children, frequently do ſervice; though perhaps not ſo much from any ſtrengthening quality of the ingredients, as from its being a ſoft, cloſe, and adheſive covering.

985. *Saponaceous plaſter.* E.

Take of gum plaſter, one pound; Caſtile ſoap, ſliced, nine ounces; common plaſter, two pounds. Melt the plaſter, and then put in the ſoap, letting the whole boil for a ſhort time, that it may become a plaſter.

986. *Stomach plaſter.*

Take of ſoft labdanum, three ounces; frankincenſe, one ounce; cinnamon, the expreſſed oil, called *oil of mace*, each half an ounce; eſſential oil of mint, one dram. Having melted the frankincenſe, add to it, firſt the labdanum ſoftened by heat, and then the oil of mace; afterwards mix theſe with the cinnamon and oil of mint; and beat them together in a warm mortar, into a maſs, which is to be kept in a cloſe veſſel. *L.*

This is a very elegant ſtomach plaſter. It is contrived ſo as to be eaſily made occaſionally (for theſe kinds of compoſitions, on account of their volatile ingredients, are not fit for keeping;) and to be but moderately adheſive, ſo as not to offend the ſkin; and that it may without difficulty be frequently taken off and renewed, which theſe ſorts of applications, in order to their producing any conſiderable effect, require to be.

Take of yellow wax, eight ounces; tacamahaca in powder, four ounces; cloves, powdered, two ounces; palm-oil, ſix ounces; expreſſed oil of mace, an ounce and a half; eſſential oil of mint, two drams Melt the wax and tacamahaca with the palm-oil; then removing the mixture from the fire, add the other ingredients, and make them into a plaſter, according to art. *E.*

Theſe plaſters are applied to the pit of the ſtomach, in weakneſs of that viſcus, in vomitings, in the diſorder improperly called the *heartburn*, &c. and ſometimes with good ſucceſs. The pit of the ſtomach, however, as Hoffman has obſerved, is not always the moſt proper place for applications of this kind to be made to: if applied to the five lower ribs of the left ſide, towards the back, the ſtomach will in general receive more benefit from them; for it appears from anatomical inſpection, that greateſt part of it is ſituated there.

987. *Bliſtering plaſter.* L.

Take of drawing plaſter, two pounds; cantharides, one pound; vinegar, half a pint. Melt the drawing plaſter; and, a little before it grows ſtiff, mix in the cantharides, reduced into a moſt ſubtile powder: then add the vinegar, and work them well together.

Take of yellow wax, two pounds; yellow roſin, hog's-lard, of each one pound; oil olive, half a pint; cantharides, a pound and a half. Reduce the cantharides firſt to a very fine powder, then rub them with the oil; and having melted the other ingredients with a gentle heat, add the cantharides to them when pretty cold. *E.*

988. *An anodyne and diſcutient plaſter.*

Take of cummin plaſter, two ounces; camphor, three drams; Thebaic extract, one dram and a half. Grind the camphor, with ſome drops of oil olive, into a very ſubtile powder; and then mix it with the other ingredients, according to art, into a plaſter.

989. *Warm plaſter.*

Take of gum plaſter, one ounce; bliſtering plaſter, two drams. Melt them together over a gentle fire.

990. *Suppurating plaſter.*

Take of gum plaſter, an ounce and a half; Burgundy pitch, half an ounce. Melt them together.

The uſes of the three foregoing compoſitions, which are taken from our hoſpitals, are ſufficiently obvious from their titles. The warm plaſter is a very ſtimulating application, of great uſe in fixed pains, as in the rheumatiſm, ſciatica, beginning chilblains, &c.

SECT. XI. *Ointments, Liniments, and Cerates.*

991. OINTMENTS and *liniments* differ from plaſters little otherwiſe than in conſiſtence. Any of the officinal plaſters, diluted with ſo much oil as will reduce it to the thickneſs of ſtiff honey, forms an ointment: by farther increaſing the oil, it becomes a liniment. *Cerates* differ from plaſters and ointments only in conſiſtence; being a ſofter kind of plaſter, or harder kind of ointment.

992. *Ointment of verdigris.* E.

Take of white wax, yellow reſin, of each two ounces; of oil olive, a pint; verdigris, half an ounce. Having melted the wax and reſin with the oil, add the verdigris firſt ground with a little of the oil, keeping the whole conſtantly ſtirring till cold.

993. *Mel Ægyptiacum.* L.

Take of verdegris, reduced into a very ſubtile powder, five ounces; honey, 14 ounces by weight; vinegar, ſeven ounces by meaſure. Boil theſe ingredients together, over a gentle fire, till they have acquired a due conſiſtence and a reddiſh colour. On keeping this mixture for ſome time, the thicker part falls to the bottom; the thinner, which floats on the top, is called *mel Ægyptiacum.*

Theſe preparations are deſigned only for external uſe, for cleanſing and deterging ulcers, and keeping down fungous fleſh: they are ſerviceable alſo in venereal ulcerations of the mouth and tonſils. If for particular purpoſes, the latter ſhould be wanted more acrid, it may be occaſionally rendered ſo by ſhaking the veſſel, ſo as to mix up the thick matter at the bottom (which contains greateſt part of the verdigris) with the upper thin one.——In the former the verdigris is ſometimes doubled.

994. *White ointment.* L. E.

Take of oil olive, one pint; white wax, four ounces; ſpermaceti, three ounces. Liquefy them by a gentle fire, and keep them conſtantly and briſkly ſtirring, till grown thoroughly cold.

995. *Ointment of white lead, commonly called* white ointment. *E.*

Take of oil olive, three pints; ceruſſe, one pound; white wax, nine ounces. Melt the wax in the oil: then gradually add the ceruſſe, and ſtir them well together, that they may be thoroughly mixed into an ointment.

This is an uſeful, cooling, and emollient ointment, of good ſervice in excoriations, and other like frettings of the ſkin.

996. *Camphorated white ointment.* L.

This is made by adding to the white ointment a dram and a half of camphor, previouſly ground with ſome drops of oil of almonds,

This ointment is ſuppoſed to be more diſcutient than the foregoing, and ſerviceable againſt cutaneous heats, itching, and ſerpiginous eruptions. It ſhould be kept in cloſe veſſels, otherwiſe the camphor will ſoon exhale: ſmelling ſtrong of this ingredient is the beſt mark of its goodneſs.

997. *Ointment of marſhmallows.* L.

Take oil of mucilages, three pints; yellow wax, one pound; yellow reſin, half a pound; common turpentine, two ounces. Melt the reſin and wax with the oil: then, having taken them from the fire, add the turpentine; and while the mixture remains hot, ſtrain it.

998. *Yellow baſilicum ointment.*

Take of oil olive, one pint; yellow wax, yellow reſin, Burgundy pitch, each one pound; common turpentine, three ounces. Melt the wax, reſin, and pitch, along with the oil, over a gentle fire; then take them from the fire, add the turpentine, and whilſt the mixture remains hot ſtrain it. *L.*

Take of yellow wax, yellow reſin, each two ounces; hog's-lard and oil olive, of each one pound. Melt them together with a gentle fire, and having removed them from it, ſtir them well till they grow cold. *E.*

Theſe are commonly employed, in dreſſings, for digeſting, cleanſing, and incarnating wounds and ulcers. They differ very little, if at all, in their effects, from the *liniment of Arcæus*, (nº 1015.)

999. *Black baſilicum ointment, or ointment of four ingredients.* L.

Take of oil olive, one pint; yellow wax, yellow reſin, dry pitch, each nine ounces. Melt them all together; and whilſt the mixture is hot, ſtrain it off.

This ointment was formerly of conſiderable eſteem for healing and incarnating wounds, &c. but is ſaid to have an inconvenience of being apt to render them foul, and produce fungous fleſh: at preſent it is rarely made uſe of; the yellow baſilicum, and the liniment of Arcæus, being in general preferred.

1000. *Green baſilicum ointment.* L.

Take of yellow baſilicum, eight ounces; oil olive, three ounces by meaſure; verdigris prepared, one ounce. Mix, and make them into an ointment.

This ointment is an efficacious detergent.

1001. *Yellow ointment.* E.

Take of quickſilver, one ounce; ſpirit of nitre, two ounces; hogs lard, tried, one pound. Diſſolve the quickſilver in the ſpirit of nitre by digeſtion in a ſand-heat; and whilſt the ſolution is very hot, mix with it the lard, previouſly melted by itſelf, and juſt beginning to grow ſtiff. Stir them briſkly together, in a marble mortar, ſo as to form the whole into an ointment.

1002. *The ſtronger blue ointment.* L.

Take of hogs lard, tried, two pounds; quickſilver, one pound; ſimple balſam of ſulphur, half an ounce. Grind the quickſilver with the balſam of ſulphur till they are perfectly incorporated; then gradually add the lard heated, and mix them carefully together.

1003. *The milder blue ointment.* L.

Take of hogs-lard, tried, four pounds; quickſilver, one pound; common turpentine, one ounce. Grind the quickſilver with the turpentine, in a mortar, till it ceaſes to appear; then gradually add the lard warmed, and carefully mix them together.

This laſt unguent turns out of a much better blue colour than the foregoing, which is of a very dingy hue. Mercurial unguents have in many caſes the ſame effect with the preparations of this mineral taken internally; and are at preſent frequently employed, not only againſt cutaneous diſorders, as alterants, but likewiſe in venereal and other obſtinate caſes, for raiſing a ſalivation. The ptyaliſm excited by unction is ſaid to be attended with the feweſt inconveniences, and to perform the moſt complete cure. In ſome conſtitutions, mercurials taken inwardly, run off by the inteſtines, without affecting the mouth; and in others, they affect the ſalival glands ſo quickly, as to occaſion a copious ptyaliſm, without extending their action to the remoter parts, and conſequently without removing the cauſe of the diſeaſe.

1004. *Ointment of gum elemi.* L.

Take of mutton-ſuet, freſh and tried, two pounds; gum elemi, one pound; common turpentine, ten ounces. Melt the gum with the ſuet; and having taken them from the fire, immediately mix the turpentine; then whilſt the maſs remains fluid, ſtrain it off.

1005. *The ointment, commonly called* liniment of Arcæus. *E.*

Take of hogs-lard, one pound; goats ſuet, or mutton ſuet, two pounds; Venice turpentine, gum elemi, each a pound and a half. Melt and ſtrain them, ſo as to make an ointment according to art.

This unguent has long been in uſe for digeſting, cleanſing, and incarnating; and for theſe purpoſes is preferred by ſome to all the other compoſitions of this kind.

1006. *Emollient ointment.* E.

Take of palm oil, four pints; freſh-drawn linſeed oil, three pints; yellow wax, one pound. Melt the wax in the oils, over a gentle fire, and ſtrain the ointment, which ſupplies the place of the *ointment of marſhmallows*.

1007. *Mercurial ointment.* E.

Take of hogs lard, three ounces; mutton-ſuet, one ounce; quickſilver, one ounce. Rub them diligently together in a mortar, till the mercurial globules diſappear. This ointment is made alſo with twice, and with thrice, the quantity of mercury.

This is the moſt ſimple of the mercurial ointments, though poſſibly as efficacious as any. It requires indeed a great deal more labour to extinguiſh the mercury in the lard alone, than when turpentine or other like ſubſtances are joined: but, in recompence, the compoſition with lard is free from an inconvenience which the others are accompanied with, viz. being apt by frequent rubbing to fret tender ſkins.

1008. *Ointment of mercury precipitate.* L.

Take of ſimple ointment, an ounce and a half; precipitated ſulphur, two drams; white mercury precipitate, two ſcruples. Mix them well together, and moiſten them with ley of tartar, that they may be made into an ointment.

This is a very elegant mercurial ointment, and frequently made uſe of againſt cutaneous diſorders.

1009. *Ointment of tar.* L. E.

Take of mutton-ſuet tried, tar, each equal weights. Melt them together, and ſtrain the mixture whilſt hot.

This compoſition, with the addition of half its weight of reſin, has long been uſed in the ſhops as a cheap ſubſtitute to the black baſilicum.

1010. *Saturnine ointment.*

Take of oil olive, half a pint; white wax, an ounce and a half; ſugar of lead, two drams. Let the ſugar of lead, reduced into a very ſubtile powder, be ground with ſome part of the oil, and the wax melted with the reſt of the oil. Mix both together, and keep them ſtirrring till the ointment is grown cold. *L.*

Take of ſugar of lead, half an ounce; white wax, three ounces; oil olive, one pint. Liquefy the oil and wax together, and gradually add the ſugar of lead, previouſly ground, with ſome of the oil; continually ſtirring them, till, growing cold, they unite into an ointment. *E.*

Both theſe ointments are uſeful coolers and deſiccatives.

1011. *The ſimple ointment.* L.

Take of hogs-lard, tried, two pounds; roſe-water, three ounces by meaſure. Beat the lard with the roſe-water, till they are well mixed; then melt them over a very gentle fire, and ſet them by for ſome time, that the water may ſubſide; pour the lard off from the water, and keep inceſſantly ſtirring and beating it about till it grows cold, ſo as to reduce it into a light incoherent maſs: laſtly, add ſo much eſſence of lemons as will be ſufficient to give a grateful odour.

1012. *The roſe ointment, commonly called* pomatum. E.

On any quantity of hogs-lard, cut into ſmall pieces, and placed in a glazed earthen veſſel, pour as much water as will riſe above it ſome inches; and digeſt them together for ten days, renewing the water every day. Then liquefy the lard with a very gentle heat, and pour it into a proper quantity of roſe-water: work them well together; and afterwards pouring off the water, add to the lard ſome drops of oil of rhodium.

Theſe ointments are in common uſe for ſoftening and ſmoothing the ſkin, and healing chaps.

1013. *Ointment of tutty.* L.

Let any quantity of prepared tutty be mixed with as much purified vipers fat as is ſufficient to reduce it into the conſiſtence of a ſoft ointment.

This ointment is deſigned for an ophthalmie. What particular virtues it receives from the vipers fat, we ſhall not preſume to determine.

In the preſent edition of the Edinburgh diſpenſatory, it is ordered to be made of four ounces of hog's lard, a dram of white wax, and an ounce of prepared tutty.

1014. *Ointment for bliſters.*

Take of hog's-lard tried, bliſtering plaſter, each equal weights. Melt them together over a very gentle fire, and keep them conſtantly ſtirring till grown cold. *L.*

Take of oil olive, one pint; yellow wax, four ounces; yellow reſin, two ounces; cantharides, an ounce and a half. Melt the wax and reſin over a gentle fire with part of the oil; then having taken them off the fire, add the cantharides firſt finely powdered, and then ground with part of the oil, continually ſtirring the mixture till it has grown cold. *E.*

1015. *The milder epiſpaſtic ointment.* E.

Take of cantharides, one ounce; white reſin, yellow wax, each one ounce; hog's-lard, Venice turpentine, each two ounces; boiling water, four ounces. Infuſe the cantharides in the water, in a cloſe veſſel, for a night; then ſtrongly preſs out, and ſtrain the liquor, and boil it with the lard till the watery moiſture is conſumed; then add the reſin, wax, and turpentine, and make the whole into an ointment.

Theſe ointments are added in the dreſſings for bliſters, intended to be made *perpetual*, as they are called, or to be kept running for a conſiderable time, which in many chronic, and ſome acute caſes, they are required to be.

The laſt, containing the ſoluble parts of the cantharides uniformly blended with the other ingredients, is more commodious, and occaſions leſs pain, though not leſs effectual in its intention than the other with the fly in ſubſtance.

1016. *White liniment.* L.

Take of oil olive, three ounces by meaſure; ſpermaceti, ſix drams; white wax, two drams. Melt them together over a gentle fire, and keep them conſtantly and briſkly ſtirring till grown cold.

This differs only in conſiſtence from the *white ointment*, 994.

1017. *Green balſam.* E.

Take of linſeed oil, oil of turpentine, each one pound; verdigris, in powder, three drams. Boil and ſtir them well together till the verdigris is diſſolved.

A balſam, ſimilar to this, is ſaid to have been greatly valued by our ſurgeons as a detergent.

1018. *Volatile liniment.*

Take of oil of hartſhorn, ſpirit of hartſhorn, each equal parts. Mix them together.

Dr Pringle obſerves, that in the inflammatory quinſey, or ſtrangulation of the fauces, a piece of flannel, moiſtened with this mixture, and applied to the throat, to be renewed every four or five hours, is one of the moſt efficacious remedies. By means of this warm ſtimulating application, the neck, and ſometimes the whole body, is put into a ſweat; which, after bleeding, either carries off or leſſens the inflammation.

1019. *White cerate.* L.

Take of oil olive, a quarter of a pint; white wax, four ounces; ſpermaceti, half an ounce. Liquefy them all together, and keep them ſtirring till the cerate is grown quite cold.

This differs from the white ointment and liniment only in being of a thicker conſiſtence.

1020. *Yellow cerate.* L.

Take of yellow baſilicum ointment, half a pound; yellow wax, one ounce. Melt them together.

This is no otherwiſe different from the yellow baſilicum, than being of a ſtiffer conſiſtence, which renders it for ſome purpoſes more commodious.

1021. *Epulotic cerate.* L.

Take of oil olive, one pint; yellow wax, calamine prepared, each half a pound. Liquefy the wax with the oil; and as ſoon as the mixture begins to grow ſtiff, ſprinkle in the calamine; keeping them conſtantly ſtirring together, till the cerate is grown quite cold.

1022. *Ointment of calamine.* E.

Take of yellow wax, one pound; oil olive, two pints; calamine prepared, nine ounces. Melt the wax with the oil, and gradually ſprinkle in the calamine, mixing and ſtirring them well together till grown cold.

Theſe compoſitions are formed upon the cerate which Turner ſtrongly recommends in cutaneous ulcerations and excoriations, and which has been uſually diſtinguiſhed by his name. They appear from experience to be excellent epulotics, and as ſuch are frequently made uſe of in practice.

1023. *Palſey ointment.*

Take of hog's-lard, oil of bays, each four ounces; ſtrong ſpirit of vitriol, one ounce. Mix, and make them into an unguent.

This irritating compoſition is applied to numbed or paralytic limbs: it ſoon reddens and inflames the ſkin, and when this effect is produced, muſt be taken off; after which, the part is to be anointed with any emollient unguent.

1024. *Liniment for the piles.*

Take of emollient ointment, two ounces; liquid laudanum, half an ounce. Mix theſe ingredients with the yolk of an egg, and work them well together.

1025. *Wax liniment.* E.

Take of oil olive, three ounces; ſpermaceti, three drams; white wax, two drams. Melt all together over a gentle fire; and keep the whole continually ſtirring till it cools.

SECT. XII. *Epithems.*

1026. *Bliſtering epithem.* L.

TAKE of cantharides reduced into a moſt ſubtile powder, wheat flour, each equal weights. Make them into a paſte with vinegar.

This compoſition is of a ſofter conſiſtence than the bliſtering plaſters, and for this reaſon is in ſome caſes preferred. Practitioners differ with regard to the degree of conſiſtence and adheſiveneſs moſt proper for applications of this kind, and ſometimes vary them occaſionally.

1027. *Cataplaſm of cummin.* L.

Take of cummin ſeeds, half a pound; bay-berries, ſcordium-leaves dried, Virginian ſnakeroot, each three ounces; cloves, one ounce; honey, thrice the weight of the powdered ſpecies. Make them into a cataplaſm.

This is a reformation of the *theriaca Londinenſis*, which for ſome time paſt has been ſcarce otherwiſe made uſe of than as a warm cataplaſm; only ſuch of its ingredients are retained as contribute moſt to this intention.

1028. *Diſcutient cataplaſm.*

Take of bryony root, three ounces; elder flowers, one ounce; gum ammoniac, half an ounce; ſal ammoniac, crude, two drams; camphorated ſpirit of wine, one ounce. Boil the roots and flowers in a ſufficient quantity of water, till they become tender; and having then bruiſed them, add to them the gum ammoniacum diſſolved in a ſufficient quantity vinegar, and likewiſe the ſal ammoniac and ſpirit: mix the whole together, ſo as to make them into a cataplaſm.

This compoſition is as good a diſcutient as any thing that can well be contrived in the form of a cataplaſm.

1029. *Ripening cataplaſm.* L.

Take of figs, four ounces; yellow baſilicum ointment, one ounce; galbanum, ſtrained, half an ounce. Beat the figs thoroughly in a mortar, occaſionally dropping in ſome ſpirit of wine or ſtrong ale; then carefully mix with them the ointment, firſt liquefied along with the galbanum.

This compoſition is a good ſuppurant or ripener; though its effects probably depend more on its keeping the part ſoft, moiſt, and warm, than on any particular qualities of the ingredients.

1030. *A ſinapiſm.* E.

Take of muſtard-ſeed, in powder, crumb of bread, each equal parts; ſtrong vinegar, as much as is ſufficient.

Mix and make them into a cataplaſm; to which is ſometimes added a little bruiſed garlic.

1031. *Compound ſinapiſm.*

Take of muſtard-ſeed in powder, crumb of bread, each two ounces; garlic, bruiſed, half an ounce; black ſoap, one ounce; ſtrong vinegar, a ſufficient quantity. Mix and make them into a cataplaſm, according to art.

Both theſe compoſitions are employed only as ſtimulants: they often inflame the part, and raiſe bliſters, but not ſo perfectly as cantharides. They are frequently applied to the ſoles of the feet in the low ſtate of acute diſeaſes, for raiſing the pulſe and relieving the head.

1031. *Alum curd.*

Take any quantity of the white of eggs. Agitate it with a ſufficiently large lump of alum, in a tin diſh, until it is coagulated.

This preparation is taken from Riverius. It is an uſeful aſtringent epithem for ſore, moiſt eyes; and excellently cools and repreſſes thin defluxions. Slighter inflammations of the eyes, occaſioned by duſt, expoſure to the ſun, or other like cauſes, are generally removed by fomenting them with warm milk and water, and waſhing them with the vitriolic water, n° 944. Where the complaint is more violent, this preparation, after the inflammation has yielded a little to bleeding, is one of the beſt external remedies. It is to be ſpread on lint, and applied at bed-time.

1032. *Emollient cataplaſm.*

Take of crumb of bread, eight ounces; white ſoap, one ounce; cows milk, freſh, a ſufficient quantity. Boil them a little together.

1033. *Stomachic cataplaſm.*

Take of the aromatic cataplaſm, one ounce; expreſſed oil of mace, two drams; anodyne balſam, as much as is ſufficient to reduce them into a proper conſiſtence.

1034. *Camphorated cataplaſm.*

Take of aromatic cataplaſm, one ounce; camphor, one dram. Mix them together.

1035. *Iſchiatic cataplaſm.*

Take of muſtard-ſeed, half a pound; white pepper, ginger, each one dram; ſimple oxymel, as much as will reduce them into a cataplaſm.

The uſe of theſe compoſitions, which are taken from the hoſpitals, may be eaſily underſtood from their titles. The laſt is a very ſtimulating application, and frequently veſicates the ſkin.

INDEX.

CACIA, n° 598.
Acid ſpirits, p. 6078.
ids, n° 102. Combined with vinous ſpirits, 682.
cali of ſea-ſalt, 644.
caline, aloetic wine, 362—364. Alcaline ſalts, fixed, p. 6072. Combined with oils and inflammable ſpirits, 6077
es, p. 6037.
e, antiſcorbutic, n° 382. Bitter, 383. Diuretic, 384. Opening, 385. Dr Butler's, 386. Cephalic, 387.
mond ſoap, 662.
oes, gum and reſin of, 615.
um whey, 357. Alum burnt, 692. Alum-water, 947. Alum curd, 1031.
ber, prepared, 267. Spirit, ſalt, and oil of, 712.
gelica ſtalks candied, 467.
imals, p. 6013, 6014.
timonial or emetic wine, n° 366. Antimonial cauſtic, 793.
timony prepared, 255. Preparations of antimony, p. 6101. Precipitated ſulphur of, n° 772. Golden ſulphur of, 773. Panacea of, 790. Medicinal regulus of, 770. Simple regulus, 771. Glaſs of, 791. Cerated glaſs of, 792. Butter of, 793. Cinnabar of, 794.
Apparatus, 117, &c.
Aquafortis, 677. Purified ditto, 678.
Aromatic ſpecies, 827, a. Aromatic powder, 827, b.

B.

Balm-water, compound, 569.
Balſam of guaiacum, 430. Of Guido, 635. Anodyne of Bates, 665. Saponaceous, 666. Green, 1017. Wade's 433.
Balſamum commendatoris, 433
Barley-water, 337.
Bates's alum-water, 946.
Beaume de commandeur, 433.
Benzoin, flowers of, 710.
Bezoar ſtone prepared, 259.
Biſmuth, magiſtery of, 797.
Bitumens, 84, 85.
Bloodſtone prepared, 261.
Boluſes, 878. Alexipharmac bolus, 879. Caſtor, 880. Diaphoretic, 881. Diuretic, 882. Againſt the dyſentery, 883. Emmenagogue, 884. Febrifuge, 885. Hyſteric, 886. Iliac, 887. Mercurial, 888. Pectoral, 889. Bolus of rhubarb with mercury, 890. Rheumatic, 891. Sudorific, 892.
Borax, ſalt of, 711.

C.

Calamine prepared, 260.
Calcination, 245.
Camphor, 42.
Cataplaſm of cummin, 1027. Diſcutient, 1028. Ripening, 1029. Emollient, 1032. Stomachic, 1033. Camphorated, 1034. Iſchiatic, 1035.
Cauſtic, common, the ſtronger, 649, a. The milder, 649, b.
Cerates, 991. White, 1019. Yellow, 1020. Epulotic, 1021.
Ceruſſe, or white lead, 745.
Chalk prepared, 258.
Cinnabar, artificial, 753.
Colbatch's ſtyptic powder, 803.
Comminution, 230.
Compoſitions, p. 6105, *et ſeqq.*
Confection, cordial, 530, 901. Of kermes, 499. Japonic, 899. Of Damocrates, 903. Of Paulina, 902.
Conſerves, 454. General method of preſerving them, 455. Of ſcurvy-graſs, 456. Of wood-ſorrel, 457. Of ſpearmint, 458. Of rue, 459. Of ſea-wormwood, 460. Of red roſes, 461. Of roſemary flowers, 462. Of Seville orange-peel, 463. Of ſloes, 464.
Copper, volatile tincture of, 741. Ammoniacal, 742.
Coral prepared, 257.
Crabs-claws prepared, 256.
Crabs-eyes prepared, 264.
Cretaceous potion, 319.
Crocus metallorum, 768. Of antimony waſhed, 969.
Cryſtallization, 193—197. 687.

D.

Decoctions, 331. White decoction, 333. Of the woods, 334. Of marſhmallow root, 335. Pectoral, 336. Of ſeneka, 350. Common for glyſters, 352. Common, 353.
Depuration, 185.
Diſtillation, 208.
Draught, 929. Cathartic, 941. Saline cathartic, 942. Diaphoretic, 943. Diuretic, 944. Anodyne diuretic, 945.

E.

Earths, 86.
Earthy ſubſtances, and ſuch as are inſoluble in water, how prepared, 252.
Eau de Carmes, 569.
Edinburgh theriaca, 903, c.
Egg-ſhells prepared, 266.
Elaterium, 601.
Electuaries, 893.
Electuary of caſſia, 894. Diacaſſia, 895. Lenitive, 896.

Pectoral, 897. Of ſcammony, 898. Thebaic, 903, d. Acid, 906. Alexiterial, 907. Anti-epileptic, 908. Antidyſenteric, 909. Aromatic, 910. Balſamic, 911. Chalybeate, 912. Of black hellebore, 913. Nephritic, 914. Paralytic, 915. Of Peruvian bark, 916. Acid purgative, 917. Saponaceous, 918. Binding, 919. Of ſulphur, 920.
Elixir of health, 421, b. Of guaiacum, 431. Volatile ditto, 432. Of aloes, 436. Proprietatis, 437. Proprietatis vitriolicum, 438. Paregoric, 439. Acid of vitriol, 440. Sweet elixir of ditto, 442. Compound elixir of myrrh, 444. Elixir ſacrum, 445.
Emulſions, 922. Common emulſion, 923. Arabic, 924. Purging, 925. With arum root, 926.
Ens veneris, 738.
Epithems, bliſtering, 1027.
Eryngo-root candied, 466.
Ether, vitriolic, 683.
Ethiops, martial, 732. Mineral, 752. Antimonial, 804.
Evaporation, 204.
Expreſſion, 221.
Exſiccation, 226.
Extract, thebaic, 286. Of wolfſbane, 296. Of hemlock, 297, 600. Of plantane, 599. Of wormwood, 603. Of leſſer centaury, 604. Of chamomile, 605. Of elecampane, 606. Of gentian, 607. Of liquorice, 608. Of black hellebore, 609. Of logwood, 610, 628. Of Peruvian bark, ſoft and hard, 611, 627. Of guaiacum wood, ſoft and hard, 612. Of rue, 613. Of ſavin, 614. Of Rudius, 616. Of jalap, 626. Cathartic, 629.
Extraction, 180. Of pulps, 282
Extracts with water, 602. With rectified ſpirit, 619. With ſpirit and water, 625.

F.

Fomentation, common, 351.
Furnaces, 117.
Fuſion, 240.

G.

Gargariſm, aſtringent, 952. Common, 953. Detergent, 954. Emollient, 955.
Gellies, 472—477.
Gilla of vitriol, 690.
Glauber's ſalt, 698. Spirit of nitre, 675. Of ſea-ſalt, 676
Glyſter of ſtarch, 956. Anodyne opiate, 957. Againſt the colic, 958. Aſtringent, 959. Aſtringent balſamic, 960. Common, 961. Domeſtic, 962. Emollient, 963. Fetid, 964. Purging, 965. Turpentine, 966.
Gold, potable, 724, 725.
Gum, 45.
Gum-reſin, 49.

H.

Hartſhorn, calcined, 281. Spirit, ſalt, and oil of, 651.
Hepar antimonii, 768.
Hiera picra, 826.
Hog's-lard tried, 276.
Honey, clarified, 278. Of roſes, 501. Solutive, 502.
Honeys and oxymels, p. 6051.
Hungary water, 571.

I

Infuſions in different menſtrua, p. 6029. Infuſions and decoctions in water, ib. In cold water, 6030. In boiling water, 6031.
Infuſion of carduus, n° 313. Of Peruvian bark, 316. Simple bitter infuſion, 320. Purging bitter ditto, 321. Bitter infuſion with ſena, 322. Common infuſion of ſena, 323. Infuſion of ſena with lemon, 324. with tamarinds, 325. Of rhubarb, 326. Of flammula jovis, 327.
Injection, balſamic, 967. Mercurial, 968.
Iron filings purified, 288. Prepared, 288. Ruſt of iron prepared, 730. Scales of iron prepared, 731. Iron ſulphurated, 734. Opening crocus of iron, 735. Aſtringent ditto, 736.
Juice of ſloes inſpiſſated, 598.
Juices, 289. Scorbutic, 295.
Juices and infuſions concentrated by evaporation, p. 6065. Inſpiſſated, n° 596.
Juleps, 927. Of chalk, 930. Of muſk, 931. Cordial, 932. Diaphoretic, 933. Diuretic, 934. Fetid, 935. Binding, 936.
Juleps, mixtures and draughts, p. 6121.

K

Kermes, confection of, 499. Mineral, 773. Syrup of, 487.
Kunckel's antimonial tablets, 851.

L

Lac ſulphuris, 722.
Lapis lazuli prepared, 262.
Lead, preparations of, p. 6095. Sugar of, n° 746.
Ley of Tartar, 645.
Lime-water, 318.
Liniments, 991. Liniment of Arcæus, 1005. White, 1016. Volatile, 1018. For the piles, 1024. Wax liniment, 1025 Saponaceous liniment, 664, b.
Liver of antimony, 768.
Locatelli's balſam, 900.
Lohochs, 921.
Lotion, ſaponaceous, 664, a.
Lotions, gargariſms, injections, &c. 946, &c.
Lozenges, cardialgic, 844. Laxative antacid, 845.
Lunar cauſtic, 727. Pills, 728

M

Magneſia alba, 699, a.
—— burnt, 699, b.
Martial flowers, 738.
Mel Ægyptiacum, 993.
Meaſures, 156.
Mercury, 749. Sugared, 751. Calcined, 754. Solution of, 755. Calx of, 756. Red calx of, 757. Red precipitate of, 757. Red corroſive of, 758. White ditto, 759. White precipitate of, 761. Sublimate corroſive, 759. Dulcified, 760. Yellow emetic, 762. Yellow precipitate of, 763.
Metallic preparations, p. 6092
Metals, n° 96.
Millepedes, &c. prepared, 288.
Mindererus's ſpirit, 704.
Minerals, p. 6014.
Minium, or red-lead, 744.
Mithridate, or confection of Damocrates, 903, a.
Mixtures, 928. Antidyſenteric, 937. Cordial, 938. Againſt the phthiſis, 939. Valerian mixture, 940.
Mucilage of gum arabic, 329. Of gum tragacanth, 330. Of quince ſeeds, 338.
Muſtard-whey, 356.
Mutton ſuet tried, 276

N

Nitre, fixed, 643. Glauber's ſpirit of, 675. Dulcified ſpirit of, 685. Purified, 688. Cubical, 700.

O

Oil of almonds, 301. Of Linſeed, 302. Of muſtar
ſeed, 303. Of ricinus, 30
Of oranges, lemons, a
citrons, 307. Of St John'
wort, 449. Of mucilage
450. Of elder, 451, Gree
452. Camphorated, ibi
Odoriferous, 453. Of worm
wood, 516. Of dill-ſeed
517. Of aniſeeds, 51
Of caraway-ſeeds, 519. O
cloves, 520. Of chamomi
flowers, 521. Of cinn
mon, 522. Of fennel-ſeed
523. Of juniper-berrie
524. Of lavender flower
525. Of bay-berries, 52
Of lemons, 527. Of mac
528. Of marjoram leave
529. Of common min
530, a. Of peppermin
530, b. Of nutmegs, 53
Of origanum, 532. Of Ja
maica pepper, 533. O
roſemary, 534. Of ru
leaves, 535. Of ſavin-leave
536. Of ſaſſafras, 537. O
Turpentine, 538, Of bo
632. Of guaiacum, 63
Compound oil of balſam
copaiba, 634. Dippel's a
nimal oil, 636. Of tart
per deliquium, 645. O
hartſhorn, 651. Of ſoo
657. Of vitriol, 672. O
amber, 712.
Oils, groſs, 30. Eſſenti
fluid, 36. 509—538. E
ſential concrete, 41. Ex
preſſed, 298. By infuſio
&c. 447. Emyreumati
632. Oils and bitume
83.
Ointments, 991. Ointment o
verdigris, 992. White, 99
Of white lead, 995. Ca
phorated, 996. Of marſh
mallows, 997. Yellow ba
ſilicum, 998. Black baſil
cum, 999. Green baſili
cum, 1000. Yellow, 100
Stronger blue, 1002. Milde
blue, 1003. Emollient
1006. Of gum elemi, 100
Mercurial, 1007. Of mer
cury precipitate, 1008. O
tar, 1009. Saturnine, 101
Simple, 1011. Roſe oint
ment, called *pomatum*, 101
Of tutty, 1013. For bliſter
1014. Milder epiſpaſtic
1015. Of calamine, 102
For the palſy, 1023.
Operations of pharmacy, P
6019.

Opiu

Opium ſtrained, 286.

Opodeldoc, 666.

Orange-peel candied, 468.

Oxymel of garlic, 503. Pectoral, 504. Of ſquills, 505. Simple, 506.

Oyſter-ſhells prepared, 265.

P

Pearls prepared, 261.

Philonium, London, 904.

Pills, 854. Pills of Rudius, 616. Ethiopic, 855. Aromatic, 856. Aloetic, 857. Of jalap, 858. Of ſcammony with aloes, 859. The more ſimple colocynth pills, 860. Cochiæ, the pills ſo called, 861. Of colocynth with aloes, 862. Deobſtruent, 863. Chalybeate ecphractic, 864. Purging deobſtruent, 865. Fetid, 866. Gum pills, 867. Mercurial pills, 868. Laxative ditto, 869. Of gamboge, 870. Thebaic, commonly called *pacific pills*, 871, a. Saopnaceous, 871, b. Storax, 871, c. Olibanum, 871, d. Pectoral, 872. Rufus's, 873. Squill pills, 874. Againſt the dyſentery, 875. Spermaceti pills, 876. Plummer's pills, 877.

Plaſters, 969. Anodyne plaſter, 970. Antihyſteric, 971. Drawing, 972. Wax, 973. Cephalic, 974. Common, 975. Sticking, 976, 977. Common with gums, 978, 979 Cummin, 980. Defenſive, 981. Melilot, 982. Mercurial, 983. Strengthening, 984. Saponaceous, 985. Stomach, 986. Bliſtering, 987. Anodyne and diſcutient, 988. Warm, 989. Suppurant, 990.

Potaſh purified, 646.

Powders, 805. Powder of arum, compound, 808. Of bole without opium, 809. Of bole with opium, 810. Compound powder of ceruſſe, 811. Of crabs-claws, 812. Compound teſtaceous powder, 813. Bezoardic powder, 814. Compound powder of contrayerva, 815, a. Powder of chalk, 815, b. Epileptic powder, 816. Powder to promote delivery, 818. Compound powder of myrrh, 817. Compound powder of ſcammony, 819. Of ſena, 820. Sternutatory powder, 821. Compound powder of amber, 824. Of gum tragacanth, 825. Aromatic powder, 827, b. Species of ſcordium without opium, 828. With opium, 829. Saline cathartic powder, 830. Carminative, 831. Diuretic, 832. Strengthening, 833. Againſt the king's evil, 834. Vermifuge, 835. Compound powder of jalap, 836. Dover's ſweating powder, 837.

Pulvis antilyſſus, 807.

Precipitation, 199.

Preparations, p. 6025, &c.

Preſerves, n° 465.

Q.

Quickſilver purified, 750.

R.

Regulus of antimony medicinal, 770. Simple 771.

Reſin, 43. Yellow, 539. Of jalap, 622. Of Peruvian bark, 623. Of ſaffron, 624.

Rob of elder-berries, 500, 597. Of juniper-berries, 617.

S.

Sal ammoniac purified, 689. Spirit and ſalt of, 658, 667. Sal polychreſtum, n° 696. Prunellæ, 697. Mirabile, 698.

Saline juices of vegetables, 50.

Salt of tartar, 638. Of wormwood, 642. Of hartſhorn, 651. Of ſoot, 657. Volatile of ſal ammoniac, 658. Of vitriol, 691. Diuretic, 703. Rochelle, 708. Eſſential of ſorrel, 709. Sedative, 711. Of amber, 712. Of ſteel, 739.

Salts, and ſaline preparations, p. 6072.

Saponaceous lotion and liniment, 664.

Scorbutic juices, 295. Whey, 358.

Sea-ſalt, Glauber's ſpirit of, 676 Spirit, of coagulated, 701.

Sebaceous matter, 34.

Septic ſtone, or potential cautery, 648.

Silver, preparations of, 726.

Soap purified, 663. Almond, 662.

Soap-ley, 647.

Solution, 160, &c.

Soot, ſpirit, ſalt, and oil of, 957.

Spirit of wine camphorated, 446. Rectified, 564. Of roſemary, 570. Of lavender, ſimple, 572. Ditto compound, 573. An odoriferous ſpirit, called *ſweet honey water*, 574. Another, 576. Of ſcurvy-graſs, golden, or purging, 576, 577. Of ſea-ſalt, coagulated, 701. Of amber, 712. Of hartſhorn 651. Of ſoot, 657. Of ſal ammoniac, 658. Cauſtic volatile, 661. Of ſal ammoniac with quicklime, 661. Of ſal ammoniac dulcified, 667. Volatile fetid, 668, 669. Volatile aromatic, 670. Volatile oily, commonly called *ſaline aromatic ſpirit*, 671. Of vitriol, weak, 672. Of vinegar, 679. Of vitriol dulciſied, 684.

Sponge burnt, 280.

Squills dried, 279.

Steel candied, 471. Prepared with ſulphur, 733. Tartarized or ſoluble, 737. Salt of, 739.

Stone, medicinal, 802.

Storax, ſtrained, 285.

Styptic powder of Colbatcb, 803.

Sublimation, 218.

Sugar of roſes, 846.

Sugar-cakes, anthelmintic, 847

Sulphur, flowers of, 715. Waſhed flowers, 716. Thick balſam of, 717. Balſam of, with Barbadoes tar, 718. With oil of turpentine, 719. With oil of aniſeeds, 720. Precipitated, 721. Volatile tincture of, 723.

Synapiſm, ſimple, 1030. Compound, 1031.

Syrups, 478. Syrup of garlic, 481. Of marſhmallows, 482. Of orange-peel, 483. Balſamic, 484, a. Of clove july-flowers, 484, b. Of colchicum, 484, c. Of ſaffron, 485. Of quinces, 486. Of kermes, 487. Of lemon-juice, 488. Of mulberries, 489. Of raſberries, 490. Of meconium, or diacodium, 491 a. Of wild poppies, 492 b. Pectoral, 493. Solutive, of roſes, 494, a, b. Of dry roſes, 494, c. Of ſquills, 495. Of ſugar, 496. Of buckthorn, 497, a. Of violets, 497, b. Of ginger, 498.

T.

Tablets, purging, 849. Kunckel's antimonial tablets, 851.

Tar-water, 317.

Tartar regenerated, 702. Cryſtals of, 705. Cream of, 706. Soluble, 707. Emetic, 795.

Theriaca Andromachi, 903, b.

Tin, 747. Powdered, 748.

Tinctures, 388. Tincture of mint, 315. Of roſes, 328. Of ipecacuanha, 371. Cephalic, 374. Of rhubarb, vinous. 375. Thebaic, 377, 418. Bitter, 392, 393. Of wormwood, 394. Aromatic, 395. Balſamic, 396. Of cantharides, 397. Of cardamoms, 398. Of caſtor, 399, 400. Of cinnamon, 401, a. Of guaiacum volatile, 401, b. Simple tincture of bark, 402. Volatile ditto, 403. Compound ditto, 404. Of ſaffron, 405. Tincture, or eſſence, of white dittany, 406. Fetid, 407. Of ſoot, 408. Of jalap, 409. Of kino, 410, a. Japonic, 410, b. Of gum-lac, 411. Of the martial flowers, 412. Of iron, 413. Of meconium, 414. Of melampodium, or black hellebore, 415. Of muſk, 416. Of myrrh, 417. Of rhubarb, 419. Saturnine, 420, a, Antiphthiſical, 420, b. Of ſena, 421, a. Compound ditto, commonly called *elixir of health*, 421, b. Of ſnakeroot, 422. Stomachic, 423. Styptic, 424. Of ſulphur, 425. Of balſam of Tolu, 426. Of valerian, 427, 428. Of white hellebore, 429. Sacred, 376.

Traumatic, or vulnerary balſam, 434.

Troches, 836. White pectoral troches, 838, a. Black pectoral 838, b. Pectoral with opium, 838, c. Of red lead, 839. Of nitre, 840. Of ſquills, 841. Of ſulphur, 842. Of Japan earth, 843. Nerve troches, 848. Of rhubarb, 850. Sialogogue troches, 852. Stomachic, 853.

Tutty, prepared, 268.

V

Vegetables, changes produced in their juices by fermentation, p. 6008. Productions from them by fire, 6009. Subſtances naturally contained in them, and ſeparable without altering their native qualities, 6010. Obſervations

tions on the whole, 6012. Subſtances extracted from them by expreſſion, 6028. Separation of their parts volatile in the heat of boiling water, 6053.
Verdigris prepared, 254.
Veſſels for pharmaceutical operations, 151.
Vinegar of ſquills, 360. Diſtilled vinegar, 679.
Vinous ſpirit combined with acids, 682.
Viper-broth, 339,—349.
Vipers fat purified, 277.
Vitriol, white, purified, 690. Calcined, 693. Week ſpirit of, 672. Dulcified ſpirit of, 684.
Vitriolated tartar, 694. Nitre, 695.
Vitriolic water, 949,—951.

W

Wade's balſam, 433.
Waters, ſimple diſtilled, 541. Spirituous diſtilled, 563.
Water, ſimple alexiterial, 549. Orange-peel, 550. Black-cherry, 551. Simple cinnamon, 552, a. Without wine, 552, b. Fennel-water, 553. Baum-water, 554. Mint-water, 555. Simple ſpearmint-water, 556. Simple peppermint-water, 557. Jamaica pepper water, 558. Simple pennyroyal water, 559, a. Damaſk-roſe water, 560. Rue-water, 561. Savin-water, 562. Hungary water, 571. Spirituous alexeterial water, 581. With vinegar, 582. Compound aniſeed-water, 583. Spirituous orange-peel water, 584. Cardamom-ſeed water, 585. Caraway-water, 586. Spirituous cinnamon-water, 587. Cinnamon-water with wine, 588. Compound juniper water, 589. Spirituous peppermint water, 590. Jamaica pepper water, 591. Nutmeg-water, 592. Spirituous pennyroyal-water, 593. Compound horſe-radiſh water, 594. Sulphurated water, 674. Alum-water, 946, 947. Sapphire-coloured water, 948. Blue vitriolic, 949. Styptic, 950. Vitriolic, 951.
Weights, 152. Table of the weights of different fluids, 159.
Wheys, p. 6034.
Wine, alkaline aloetic, 362,—364. Bitter, 365. Steel wine, 367. Saffron wine, 369. Ipecacuanha wine, 370. Viper wine, 372. Wine of millepedes, 373. Of white dittany, 380.

Z

Zinc purified, 799. Flowers of, 800. Salt or vitriol of, 800.

Pharos, Pharſalus.

PHAROS, (Homer, Strabo, &c.) a ſmall oblong iſland, adjoining to the continent of Egypt, over-againſt Alexandria. On this iſland ſtood a cognominal light-tower, of four ſides, each ſide a ſtadium in length; and the tower ſo high, as to be ſeen 100 miles off. Some affirm, each of its four corners reſted on a large ſea-crab of glaſs or of hard tranſparent ſtone of Ethiopia or Memphis. Others imagine, the crabs were only added externally to the baſe by way of ornament, or as emblematical of its ſituation and uſe. The architect was Soſtratus the Cnidian, as appears by an inſcription on the tower, under Ptolemy Philadelphus, who laid out 800 talents upon it. On account of the port of Alexandria, the entrance to which was difficult and dangerous, the Pharos was called the *key of the Egyptian ſea*, or even of Egypt itſelf, (Lucan): and Pharos, from being a proper name, is become an appellative, to denote all light-houſes.

PHAROS, or *Phare*, a light-houſe; a pile raiſed near a port, where fire is kept burning in the night, to guide and direct veſſels near at hand. The pharos of Alexandria, built in the iſland of Pharos, at the mouth of the Nile, was anciently very famous, inſomuch as to communicate its name to all the reſt. This moſt magnificent tower conſiſted of ſeveral ſtories and galleries, with a lanthorn at top, in which a light being continually burning, might be ſeen for many leagues at ſea, and along the coaſt.

PHARSALUS, PHARSALOS, *Pharſalia*, or *Pharſalium*, (anc. geog.), a town of the Phthiotis, a diſtrict of Theſſaly, near Pheræ and Lariſſa, to which laſt place Pompey fled from the plains of Pharſalus; watered by the river Enipeus, which falls into the Apidanus, and both together into the Peneus. Between Pharſalus and Enipeus, Pompey drew up his men at the fatal battle of Pharſalia.

Pharſalus.

In this battle, the advantage with reſpect to numbers was greatly on the ſide of Pompey. That general himſelf was on the left with the two legions which Cæſar had returned to him at the beginning of the war. Scipio, Pompey's father-in-law, was in the centre, with the legions he had brought from Syria, and the reinforcements ſent by ſeveral kings and ſtates of Aſia. The Cilician legion, and ſome cohorts, which had ſerved in Spain, were in the right, under the command of Afranius. As Pompey's right wing was covered by the Enipeus, he ſtrengthened the left with his ſlingers, archers, and the 7000 Roman horſe, on whom chiefly his party founded their hopes of victory. The whole army was drawn up in three lines, with very little ſpaces between them. In conformity to this diſpoſition, Cæſar's army was drawn up in the following order: The tenth legion, which had on all occaſions ſignalized themſelves above all the reſt, was placed in the right wing, and the ninth in the left; but as the latter had been conſiderably weakened in the action at Dyrrhachium, the eighth legion was poſted ſo near it, as to be able to ſupport and reinforce it upon occaſion. The reſt of Cæſar's forces filled up the ſpace between the two wings. Marc Antony commanded the left wing, Sylla the right, and Cneius Domitius Calvinus the main body. As for Cæſar, he poſted himſelf on the right over-againſt Pompey, that he might have him always in his ſight.

Thus was the whole plain covered, from Pharſalia to the Enipeus, with two armies, dreſſed and armed after the ſame manner, and bearing the ſame enſigns, the Roman eagles. Pompey obſerving how well the enemy kept their ranks, expecting quietly the ſignal of battle, and on the contrary how impatient and unſteady his own men were, running up and down in great diſorder for want of experience, he began to be afraid leſt his ranks ſhould be broken upon the firſt onſet; and therefore commanded the foot in the front to keep their ground, and quietly wait for the enemy. The two armies, though within reach of each other, kept a mournful ſilence; but at length the trumpets ſounded the charge, and Cæſar's army advanced in good order to begin the attack, being encouraged by the example of one Caius Craſtinus, a centurion, who at the head of 120 men threw himſelf upon the enemy's firſt line with incredible fury. This he did to acquit himſelf of a promiſe he had ſolemnly made to Cæſar, who, meeting him as he was going out of his tent in the morning, aſked him, after ſome diſcourſe, *What his opinion was touching the event of the battle?* To which he, ſtretching out his hand, replied aloud, *Thine is the victory, Cæſar; thou ſhalt glorioufly conquer*,

quer, and I myſelf this day will be the ſubject of thy praiſe either dead or alive. In purſuance of this promiſe, he broke out of his rank, as ſoon as the trumpets ſounded; and, at the head of his company, ran in upon the enemy, and made a great ſlaughter of them. But while he was ſtill preſſing forward, forcing his way through the firſt line, one of Pompey's men ran him in at the mouth with ſuch violence, that the point of his ſword came out at the hind-part of his neck. Upon his death, Pompey's ſoldiers took courage, and with great bravery ſtood the enemy's onſet. While the foot were thus ſharply engaged in the centre, Pompey's horſe in the left wing marched up confidently; and having firſt widened their ranks, with a deſign to ſurround Cæſar's right wing, charged his cavalry, and forced them to give ground. Hereupon Cæſar ordered his horſe to retreat a little, and give way to the ſix cohorts, which he had poſted in the rear as a body of reſerve. Theſe, upon a ſignal given, coming up, charged the enemy's horſe with that reſolution and good order which is peculiar to men who have ſpent all their lives in camps. They remembered their inſtructions, not ſtriking at the legs or thighs of the enemy, but aiming only at their faces. This unexpected and new manner of fighting had the deſired effect. For the young patricians, whom Cæſar contemptuouſly calls the *pretty young dancers*, not being able to bear the thoughts of having their faces deformed with ſcars, turned their backs, and, covering their faces with their hands, fled in the utmoſt confuſion, leaving the foot at the mercy of the enemy. Cæſar's men did not purſue the fugitives; but charging the foot of that wing, now naked and unguarded, ſurrounded them, and cut moſt of them in pieces.

Pompey was ſo tranſported with rage, in ſeeing the flower of his forces thus put to flight or cut in pieces, that he left his army, and retired ſlowly towards his camp, looking more like a man diſtracted and beſide himſelf, than one who by his exploits had acquired the name of *the Great*. When he had reached the camp, he retired to his tent, without ſpeaking a word to any; and continued there, like one diſtracted and out of his ſenſes, till his whole army was defeated. Cæſar no ſooner ſaw himſelf maſter of the field, than he marched to attack the enemy's entrenchments, that Pompey might not have time to recollect himſelf. When Pompey was informed that his rival was advancing to attack his entrenchments, he then firſt ſeemed to have recovered his ſenſes, and cried out, *What, into my camp too?* He ſaid no more; but immediately laying aſide the marks of his dignity, and putting on ſuch a garment as might beſt favour his flight, he ſtole out at the decuman gate, and took the road to Lariſſa, which city had hitherto ſhewn great attachment to him. In the mean time, Cæſar began the attack on the enemy's camp, which was vigorouſly defended by the cohorts Pompey had left to guard it; but they were at length forced to yield. Cæſar was not a little ſurpriſed, when, after having forced the entrenchments, he found the enemy's tents and pavilions richly adorned with carpets and hangings, their couches ſtrewed with flowers, their tables ready ſpread, and ſide-boards ſet out with abundance of plate, bowls, and glaſſes, and ſome of them even filled with wine. So great was the confidence of Pompey's party, that they made preparations before-hand for pleaſures to be enjoyed after the victory, which they thought certain. In Pompey's tent, Cæſar found the box in which he kept his letters: but, with a moderation and magnanimity worthy of himſelf, he burnt them all, without reading one; ſaying, that he had rather be ignorant of crimes, than obliged to puniſh them.

The next day, when the dead were numbered, it appeared that Cæſar had ſcarce loſt 200 men; among whom was about 30 centurions, whom Cæſar cauſed to be buried with great ſolemnity. He did particular honours to the body of Craſtinus, who had begun the battle; and ordered his aſhes to be depoſited in a tomb, which he erected to his memory. On Pompey's ſide, the number of the dead amounted to 15,000 according to ſome, and to 25,000 according to others. Cæſar took 24,000 priſoners, eight eagles, and 180 enſigns.

PHARYNX, in antomy. See there, n° 353.

PHASEOLUS, the KIDNEY-BEAN; a genus of the decandria order, belonging to the diadelphia claſs of plants. There is only one ſpecies; but of this there are many varieties. Thoſe principally cultivated for the table are, 1. The common white, or Dutch kidney-bean. 2. The ſmaller kidney-bean, commonly called the *Batterſea kidney-bean*. And, 3. The upright ſort, called the *tree kidney-bean*.

1. The firſt ſort was ſome time ago propagated in England, and is ſtill in Holland: it grows very tall, and requires long ſtakes and poles to climb on, and its beans are conſiderably broad: this makes them leſs ſaleable in the markets, people ſuppoſing them to be old becauſe they are broad; and they are hence grown into diſuſe, though a much more valuable kind for eating than any other.

2. The ſecond ſort, or Batterſea bean, is what is more univerſally cultivated: it never grows very tall, nor rambles far, and the air can eaſily paſs between the rows, becauſe of its moderate growth; and this makes it bear plentifully, and ripen well for the table. It is the beſt-taſted bean, except the laſt.

3. The third, or tree kidney-bean, is alſo a plentiful bearer, and never rambles, but grows up in form of a ſhrub; but its beans are broader than the Batterſea kind, and are not ſo well taſted.

They are all propagated from ſeeds, which are to be put into the ground in the latter end of March or beginning of April for an early crop: but theſe ſhould have a warm ſituation and a dry ſoil; they muſt alſo be planted in a dry ſeaſon. The manner of planting them is, to draw lines with a bough over the bed, at two feet and a half diſtance, into which the ſeeds are to be dropped at about two inches aſunder; and the earth is to be drawn over them with the head of a rake, to cover them about an inch deep. In a week after ſowing, the plants will appear, and the earth ſhould be drawn up about their ſtalks as they riſe up; for a few days after this they will require no further care, except to be kept clear from weeds, and, when the beans appear, to have them gathered twice a-week; for if the beans are ſuffered to hang on too long, they not only become of no value, but they weaken the plant. The firſt crop of kidney-beans will continue a month in good order; and to ſupply the table afterwards,

wards, there ſhould be freſh ſowings in March, April, May, and June, the laſt of which will continue till the froſts come to deſtroy them. Some raiſe their early crops on hot-beds; and this is to be done exactly in the ſame manner as the raiſing the early cucumbers.

PHASES, in aſtronomy, from the Greek word φαινω, "to appear;" the ſeveral appearances or quantities of illumination of the moon, Venus, Mercury, and the other planets. See ASTRONOMY.

PHASIANUS, in ornithology, a genus belonging to the order of gallinæ. The cheeks are covered with a ſmooth naked ſkin. There are ſix ſpecies, *viz.*

Dunghill Cock.

1. The gallus, or common dunghill cock and hen, with a compreſſed caruncle or fleſhy comb on the top of the head, and a couple of caruncles or wattles under the chin. The ears are naked, and the tail is compreſſed and erected. Of all other birds, perhaps this ſpecies affords the greateſt number of varieties; there being ſcarce two to be found that exactly reſemble each other in plumage and form. The tail, which makes ſuch a beautiful figure in the generality of theſe birds, is yet found entirely wanting in others; and not only the tail, but the rump alſo. The toes, which are uſually four in all animals of the poultry kind, yet in a ſpecies of the cock are found to amount to five. The feathers, which lie ſo ſleek and in ſuch beautiful order in moſt of thoſe we are acquainted with, are in a peculiar breed all inverted, and ſtand ſtaring the wrong way. Nay, there is a ſpecies that comes from Japan, which inſtead of feathers ſeems to be covered over with hair.

It is not well aſcertained when the cock was firſt made domeſtic in Europe; but it is generally agreed that we firſt had him in our weſtern world from the kingdom of Perſia. Ariſtophanes calls the cock the *Perſian bird;* and tells us he enjoyed that kingdom before ſome of its earlieſt monarchs. This animal was in fact known ſo early even in the moſt ſavage parts of Europe, that we are told the cock was one of the forbidden foods among the ancient Britons. Indeed, the domeſtic fowl ſeems to have baniſhed the wild one. Perſia itſelf, that firſt introduced it to our acquaintance, ſeems no longer to know it in its natural form; and if we did not find it wild in ſome of the woods of India, as well as thoſe of the iſlands in the Indian ocean, we might begin to doubt, as we do with regard to the ſheep, in what form it firſt exiſted in a ſtate of nature. But the cock is ſtill found in the iſlands of Tinian, in many others of the Indian ocean, and in the woods on the coaſt of Malabar, in his ancient ſtate of independance. In his wild condition, his plumage is black and yellow, and his comb and wattles yellow and purple. There is another peculiarity alſo in thoſe of the Indian woods; their bones, which, when boiled, with us are white, as every body knows, in thoſe are as black as ebony.

In their firſt propagation in Europe, there were diſtinctions then that now ſubſiſt no longer. The ancients eſteemed thoſe fowls whoſe plumage was reddiſh as invaluable; but as for the white, it was conſidered as utterly unfit for domeſtic purpoſes. Theſe they regarded as ſubject to become a prey to rapacious birds; and Ariſtotle thinks them leſs fruitful than the former. Indeed, his diviſion of thoſe birds ſeems taken from their culinary uſes: the one ſort he calls *generous and noble*, being remarkable for fecundity; the other ſort, *ignoble and uſeleſs*, from their ſterility. Theſe diſtinctions differ widely from our modern notions of generoſity in this animal; that which we call the *game-cock* being by no means ſo fruitful as the ungenerous dunghill cock, which we treat with contempt. The Athenians had their cock-matches as well as we; but it is probable they did not enter into our refinement of chooſing out the moſt barren of the ſpecies for the purpoſes of combat.

However this be, no animal in the world has greater courage than the cock when oppoſed to one of his own ſpecies; and in every part of the world where refinement and poliſhed manners have not entirely taken place, cock-fighting is a principal diverſion. In China, India, the Philippine iſlands, and all over the Eaſt, cock-fighting is the ſport and amuſement even of kings and princes. With us it is declining every day; and it is to be hoped it will in time become only the paſtime of the loweſt vulgar. See the article COCK-*Fighting*.

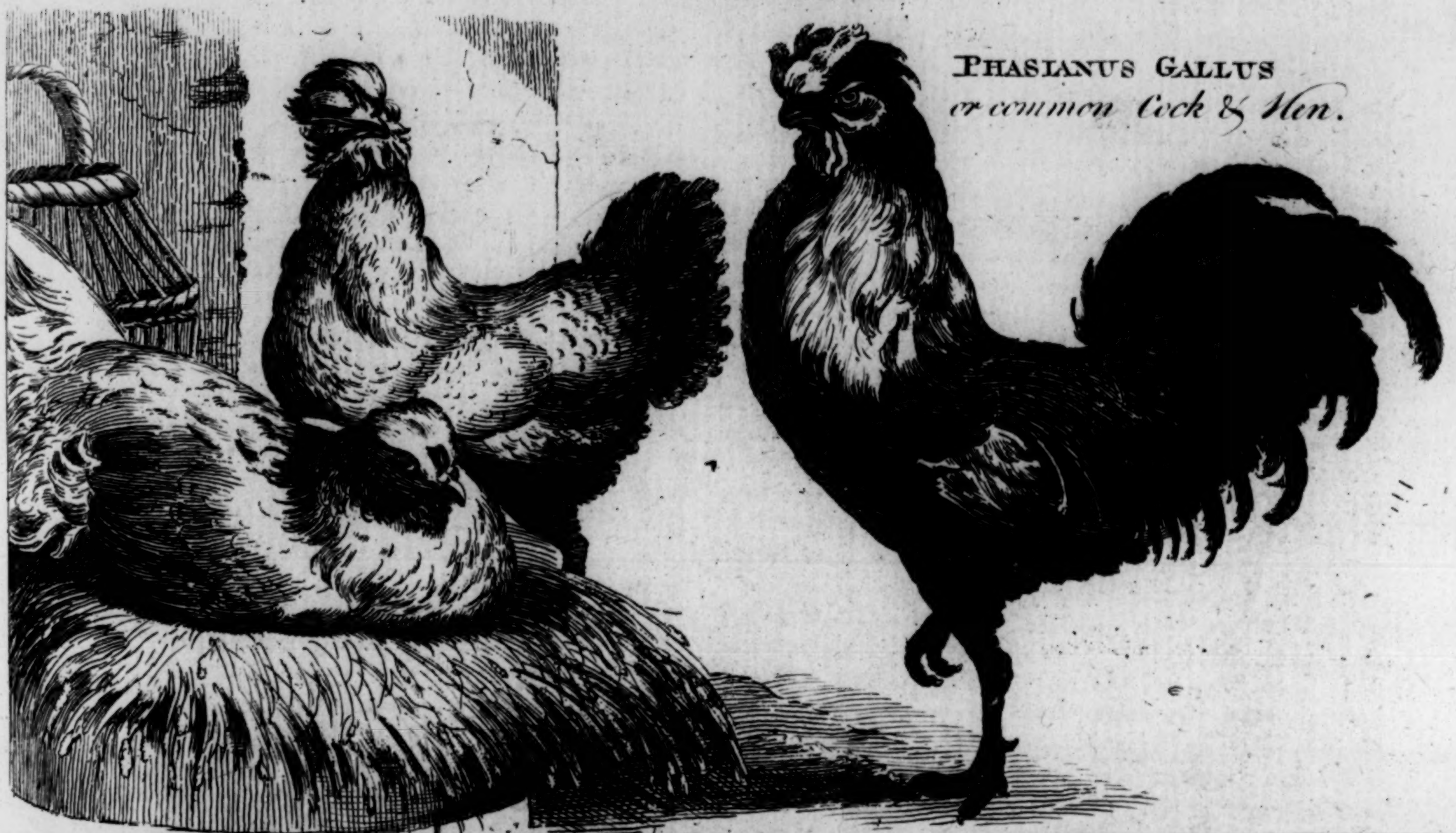
Domeſtic Hen.

The cock claps his wings before he ſings or crows. His ſight is very piercing; and he never fails to cry in a peculiar manner, when he diſcovers any bird of prey in the air. His extraordinary courage is thought to proceed from his being the moſt ſalacious of all other birds whatſoever. A ſingle cock ſuffices for ten or a dozen hens; and it is ſaid of him that he is the only animal whoſe ſpirits are not abated by indulgence. But then he ſoon grows old; the radical moiſture is exhauſted; and in three or four years he becomes utterly unfit for the purpoſes of impregnation. "Hens alſo, (to uſe the words of Willoughby), as they for the greateſt part of the year daily lay eggs, cannot ſuffice for ſo many births, but for the moſt part after three years become effete and barren: for when they have exhauſted all their ſeed-eggs, of which they had but a certain quantity from the beginning, they muſt neceſſarily ceaſe to lay, there being no new ones generated within."

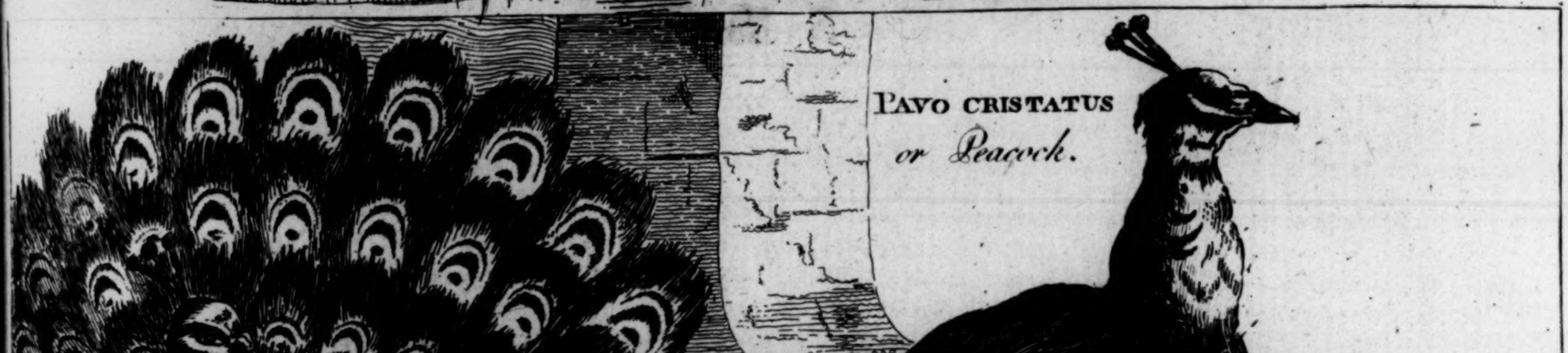
The hen ſeldom clutches a brood of chickens above once a ſeaſon, though inſtances have been known in which they produced two. The number of eggs a domeſtic hen will lay in the year are above 200, provided ſhe be well fed and ſupplied with water and liberty. It matters not much whether ſhe be trodden by the cock or no; ſhe will continue to lay, although the eggs of this kind can never by hatching be brought to produce a living animal. Her neſt is made without any care, if left to herſelf; a hole ſcratched into the ground, among a few buſhes, is the only preparation ſhe makes for this ſeaſon of patient expectation. Nature, almoſt exhauſted by its own fecundity, ſeems to inform her of the proper time for hatching, which ſhe herſelf teſtifies by a clucking note, and by diſcontinuing to lay. The good houſewives, who often get more by their hens laying than by their chickens, often artificially protract this clucking ſeaſon, and ſometimes entirely remove it. As ſoon as a hen begins to cluck, they ſtint her in her proviſions; which, if that fails, they plunge her into cold water; this, for the time, effectually puts back her hatching; but then it often kills the poor bird, who takes cold and dies under the operation.

If left entirely to herſelf, the hen would ſeldom lay above 20 eggs in the ſame neſt, without attempting to hatch

Plate CCXXXV.



PHASIANUS GALLUS
or common Cock & Hen.



PAVO CRISTATUS
or Peacock.

Hen.
A. Bell sculp.

3 MA 53

hatch them: but in proportion as ſhe lays, her eggs are removed; and ſhe continues to lay, vainly hoping to increaſe the number. In the wild ſtate, the hen ſeldom lays above 15 eggs; but then her proviſion is more difficultly obtained, and ſhe is perhaps ſenſible of the difficulty of maintaining too numerous a family.

When the hen begins to ſit, nothing can exceed her perſeverance and patience: ſhe continues for ſome days immoveable; and when forced away by the importunities of hunger, ſhe quickly returns. Sometimes alſo her eggs become too hot for her to bear, eſpecially if ſhe be furniſhed with too warm a neſt within doors, for then ſhe is obliged to leave them to cool a little: thus the warmth of the neſt only retards incubation, and often puts the brood a day or two back in the ſhell. While the hen ſits, ſhe carefully turns her eggs, and even removes them to different ſituations; till at length, in about three weeks, the young brood begin to give ſigns of a deſire to burſt their confinement. When by the repeated efforts of their bill, which ſerves like a pioneer on this occaſion, they have broke themſelves a paſſage through the ſhell, the hen ſtill continues to ſit till all are excluded. The ſtrongeſt and beſt chickens generally are the firſt candidates for liberty; the weakeſt come behind, and ſome even die in the ſhell. When all are produced, ſhe then leads them forth to provide for themſelves. Her affection and her pride ſeem then to alter her very nature, and correct her imperfections. No longer voracious or cowardly, ſhe abſtains from all food that her young can ſwallow, and flies boldly at every creature that ſhe thinks is likely to do them miſchief. Whatever the invading animal be, ſhe boldly attacks him; the horſe, the hog, or the maſtiff. When marching at the head of her little troop, ſhe acts the commander; and has a variety of notes to call her numerous train to their food, or to warn them of approaching danger. Upon one of theſe occaſions, the whole brood have been ſeen to run for ſecurity into the thickeſt part of an hedge, while the hen herſelf ventured boldly forth, and faced a fox that came for plunder.

Ten or twelve chickens are the greateſt number that a good hen can rear and clutch at a time; but as this bears no proportion to the number of her eggs, ſchemes have been imagined to clutch all the eggs of an hen, and thus turn her produce to the greateſt advantage. By theſe contrivances it has been obtained, that a hen that ordinarily produces but 12 chickens in the year, is found to produce as many chickens as eggs, and conſequently often above 200. This contrivance is the artificial method of HATCHING chickens in ſtoves, as is practiſed at Grand Cairo; or in a chemical elaboratory properly graduated, as has been effected by Mr Reaumur. At Grand Cairo, they thus produce 6000 or 7000 chickens at a time; where, as they are brought forth in their mild ſpring, which is warmer than our ſummer, the young ones thrive without clutching. But it is otherwiſe in our colder and unequal climate; the little animal may without much difficulty be hatched from the ſhell, but they almoſt all periſh when excluded. To remedy this, Reaumur has made uſe of a woollen hen, as he calls it; which was nothing more than putting the young ones in a warm baſket, and clapping over them a thick woollen canopy.

Capons may very eaſily be taught to clutch a freſh brood of chickens throughout the year; ſo that when one little colony is thus reared, another may be brought to ſucceed it. Nothing is more common than to ſee capons thus employed; and the manner of teaching them is this: Firſt the capon is made very tame, ſo as to feed from one's hand; then, about evening, they pluck the feathers off his breaſt, and rub the bare ſkin with nettles; they then put the chickens to him, which preſently run under his breaſt and belly, and probably rubbing his bare ſkin gently with their heads, allay the ſtinging pain which the nettles had juſt produced. This is repeated for two or three nights, till the animal takes an affection to the chickens that have thus given him relief, and continues to give them the protection they ſeek for: perhaps alſo the querulous voice of the chickens may be pleaſant to him in miſery, and invite him to ſuccour the diſtreſſed. He from that time brings up a brood of chickens like a hen, clutching them, feeding them, clucking, and performing all the functions of the tendereſt parent. A capon once accuſtomed to this ſervice, will not give over; but when one brood is grown up, he may have another nearly hatched put under him, which he will treat with the ſame tenderneſs he did the former.

The cock, from his ſalaciouſneſs, is allowed to be a ſhort-lived animal; but how long theſe birds live, if left to themſelves, is not yet well aſcertained by any hiſtorian. As they are kept only for profit, and in a few years become unfit for generation, there are few that, from mere motives of curioſity, will make the tedious experiment of maintaining a proper number till they die. Aldrovandus hints their age to be 10 years; and it is probable that this may be its extent. They are ſubject to ſome diſorders; and as for poiſons, beſides nux vomica, which is fatal to moſt animals except man, they are injured, as Linnæus aſſerts, by elderberries; of which they are not a little fond.

Pheaſants.

2. The motmot, or Guinea pheaſant, is browniſh, ſomewhat red below, with a wedge-like tail, and wants ſpurs. 3. The colchicus is red, with a blue head, a wedge-ſhaped tail, and papillous cheeks. It is a native of Africa and Aſia. 4. The argus is yellowiſh, with black ſpots, a red face, and a blue creſt on the back part of the head. It is found in Chineſe Tartary. 5. The pictus has a yellow creſt, a red breaſt, and a wedge-ſhaped tail. It is a native of China. 6. The necthemerus, is white, with a black creſt and belly, and a wedge-ſhaped tail. It is a native of China.

Pheaſants were originally brought into Europe from the banks of the Phaſis, a river of Colchis, in Aſia Minor; and from whence they ſtill retain their name. Next to the peacock, they are the moſt beautiful of birds, as well for the vivid colour of their plumes as for their happy mixtures and variety. It is far beyond the power of the pencil to draw any thing ſo gloſſy, ſo bright, or points ſo finely blending into each other. We are told, that when Crœſus, king of Lydia, was ſeated on his throne, adorned with royal magnificence and all the barbarous pomp of eaſtern ſplendour, he aſked Solon if he had ever beheld any thing ſo fine? The Greek philoſopher, no way moved by the objects before him, or taking a pride in his native ſimplicity, replied, That after having ſeen the beautiful plumage of the pheaſant, he could be aſtoniſhed at no other finery.

Theſe birds, tho' ſo beautiful to the eye, are not leſs delicate when ſerved up to the table. Their fleſh is conſidered as the greateſt dainty; and when the old phyſicians ſpoke of the wholeſomeneſs of any viands, they made their compariſon with the fleſh of the pheaſant. However, notwithſtanding all theſe perfections to tempt the curioſity or the palate, the pheaſant has multiplied in its wild ſtate.

A ſpirit of independence ſeems to attend the pheaſant even in captivity. In the woods, the hen-pheaſant lays from 18 to 20 eggs in a ſeaſon; but in a domeſtic ſtate, ſhe ſeldom lays above 10. In the ſame manner, when wild, ſhe hatches and leads up her brood with patience, vigilance, and courage; but when kept tame, ſhe never ſits well, ſo that a hen is generally her ſubſtitute upon ſuch occaſions: and as for leading her young to their food, ſhe is utterly ignorant of where it is to be found; and the young birds ſtarve, if left ſolely to her protection. The pheaſant, therefore, on every account, ſeems better left at large in the woods than reclaimed to priſtine captivity. Its fecundity when wild is ſufficient to ſtock the foreſt; its beautiful plumage adorns it; and its fleſh retains a higher flavour from its unlimited freedom.

However, it has been the aim of late to take theſe birds once more from the woods, and to keep them in places fitted for their reception. Like all others of the poultry kind, they have no great ſagacity, and ſuffer themſelves eaſily to be taken. At night they rooſt upon the higheſt trees of the wood; and by day they come down into the lower brakes and buſhes, where their food is chiefly found. They generally make a kind of flapping noiſe when they are with the females; and this often appriſes the ſportſman of their retreats. At other times he tracks them in the ſnow, and frequently takes them in ſpringes. But of all birds they are ſhot moſt eaſily; as they always make a whirring noiſe when they riſe, by which they alarm the gunner, and being a large mark, and flying very ſlow, there is ſcarce any miſſing them.

When theſe birds are taken young into keeping, they become as familiar as chickens: and when they are deſigned for breeding, they are put together in a yard, five hens to a cock; for this bird, like all of the poultry kind, is very ſalacious. In her natural ſtate the female makes her neſt of dry graſs and leaves; the ſame muſt be laid for her in the pheaſandry, and ſhe herſelf will ſometimes properly diſpoſe them. If ſhe refuſes to hatch her eggs, then a common hen muſt be got to ſupply her place, which taſk ſhe will perform with perſeverance and ſucceſs. The young ones are very difficult to be reared; and they muſt be ſupplied with ants-eggs, which is the food the old one leads them to gather when wild in the woods. To make theſe go the farther, they are to be chopped up with curds or other meat; and the young ones are to be fed with great exactneſs, both as to the quantity and the time of their ſupply. This food is ſometimes alſo to be varied; and wood-lice, ear-wigs, and other inſects, are to make a variety. The place where they are reared muſt be kept extremely clean; their water muſt be changed twice or thrice a-day; they muſt not be expoſed till the dew is off the ground in the morning, and they ſhould always be taken in before ſun-ſet. When they become adult, they very well can ſhift for themſelves, but they are particularly fond of oats and barley.

In order to increaſe the breed, and make it ſtill more valuable, Longolius teaches us a method that appears very peculiar. The pheaſant is a very bold bird when firſt brought into the yard among other poultry, not ſparing the peacock, nor even ſuch young cocks and hens as it can maſter; but after a time it will live tamely among them, and will at laſt be brought to couple with a common hen. The breed thus produced take much ſtronger after the pheaſant than the hen; and in a few ſucceſſions, if they be let to breed with the cock-pheaſant, for the mixture is not barren, there will be produced a ſpecies more tame, ſtronger, and more prolific; ſo that he adds, that it is ſtrange why moſt of our pheaſandries are not ſtocked with birds produced in this manner.

The pheaſant, when full grown, ſeems to feed indifferently upon every thing that offers. It is ſaid by a French writer, that one of the king's ſportſmen ſhooting at a parcel of crows that were gathered round a dead carcaſe, to his great ſurpriſe upon coming up, found that he had killed as many pheaſants as crows. It is even aſſerted by ſome, that ſuch is the carnivorous diſpoſition of this bird, that when ſeveral of them are put together in the ſame yard, if one of them happens to fall ſick, or ſeems to be pining, that all the reſt will fall upon, kill, and devour it. Such is the language of books; thoſe who have frequent opportunities of examining the manners of the bird itſelf, know what credit ought to be given to ſuch an account.

PHASMATA, in phyſiology, certain appearances ariſing from the various tinctures of the clouds by the rays of the heavenly bodies, eſpecially the ſun and moon. Theſe are infinitely diverſified by the different figures and ſituations of the clouds, and the appulſes of the rays of light.

PHASSACHATES, in natural hiſtory, the name of a ſpecies of agate, which the ancients, in its various appearances, ſometimes called *leucachates* and *perileucos*.

PHEASANT, in ornithology. See PHASIANUS.

PHELLANDRIUM, WATER-HEMLOCK, a genus of the digynia order, belonging to the pentandria claſs of plants. There are two ſpecies; one of which, viz. the aquaticum, is a native of Britain. This grows in ditches and ponds, but is not very common. The ſtalk is remarkably thick and dichotomous, and grows in the water. It is a poiſon to horſes, bringing upon them, as Linnæus informs us, a kind of palſy; which, however, he ſuppoſes to be owing not ſo much to the noxious qualities of the plant itſelf, as to thoſe of an inſect which feeds upon it, breeding within the ſtalks, and which he calls *curculio paraplecticus*. The Swedes give ſwine's dung for the cure. The ſeeds are ſometimes given in intermittent fevers, and the leaves are by ſome added to diſcutient cataplaſms. In the winter, the roots and ſtem, diſſected by the influence of the weather, afford a very curious ſkeleton or network. Horſes, ſheep, and goats, eat the plant; ſwine are not fond of it; cows refuſe it.

PHENICIA. See PHOENICIA.

PHEONS, in heraldry, the barbed heads of darts, arrows, or other weapons.

PHIAL, a well-known veſſel made of glaſs, uſed

for

Phidias
||
Philadelphia.

for various purpoſes.

Leyden Phial; a phial of glaſs coated on both ſides with tin-foil for a conſiderable way up the ſides, of great uſe in electrical experiments. See Electricity, *paſſim*.

PHIDIAS, the moſt famous ſculptor of antiquity, was an Athenian, and a contemporary of the celebrated Pericles, who flouriſhed in the 83d Olympiad. This wonderful artiſt was not only conſummate in the uſe of his tools, but accompliſhed in thoſe ſciences and branches of knowledge which belong to his profeſſion, as hiſtory, poetry, fable, geometry, optics, &c. He firſt taught the Greeks to imitate nature perfectly in this way; and all his works were received with admiration. They were alſo incredibly numerous; for it was almoſt peculiar to Phidias, that he united the greateſt facility with the greateſt perfection. His Nemeſis was ranked among his firſt pieces: it was carved out of a block of marble, which was found in the camp of the Perſians after they were defeated in the plains of Marathon. He made an excellent ſtatue of Minerva for the Plateans; but the ſtatue of this goddeſs in her magnificent temple at Athens, of which there are ſtill ſome ruined remains, was an aſtoniſhing production of human art. Pericles, who had the care of this pompous edifice, gave orders to Phidias, whoſe prodigious talents he well knew, to make a ſtatue of the goddeſs; and Phidias formed a figure of ivory and gold 39 feet high. Writers never ſpeak of this illuſtrious monument of ſkill without raptures; yet what has rendered the name of the artiſt immortal, proved at that time his ruin. He had carved upon the ſhield of the goddeſs his own portrait, and that of Pericles; and this was, by thoſe that envied them, made a crime in Phidias. He was alſo charged with embezzling part of the materials which were deſigned for the ſtatue. Upon this he withdrew to Elis, and revenged himſelf upon the ungrateful Athenians, by making for the Elians the Olympic Jupiter: a prodigy of art, and which was afterwards ranked among the ſeven wonders of the world. It was of ivory and gold; 60 feet high, and every way proportioned. "The majeſty of the work did equal the majeſty of the god," ſays Quintilian, "and its beauty ſeems to have added "luſtre to the religion of the country." Phidias concluded his labours with this maſter-piece; and the Elians, to do honour to his memory, erected, and appropriated to his deſcendents, an office, which conſiſted in keeping clean this magnificent image.

PHIDITIA, in Grecian antiquity, feaſts celebrated with great frugality at Sparta. They were held in the public places and in the open air. Rich and poor aſſiſted at them equally, and on the ſame footing; their deſign being to keep up peace, friendſhip, good underſtanding and equality among the citizens great and ſmall. It is ſaid that thoſe who attended this feaſt brought each a buſhel of flour, eight meaſures of wine named *chorus*, five mince of cheeſe, and as many figs.

PHILADELPHIA, the capital of the province of Penſylvania in North America, ſituated in W. Lon. 75. 0. N. Lat. 40. 30. It is one of the moſt beautiful and regular cities in the world, being an oblong of two miles, extending from the river Delaware to the Schuylkill, with the eaſt end fronting the river Delaware, the weſt the river Schuylkill, and each front a mile in length. The river Delaware is navigable from the ſea for large veſſels above 200 miles, and that of Schuykill as far as Philadelphia. Every man in poſſeſſion of 1000 acres has his houſe either in one of the fronts facing the rivers, or in the high-ſtreet, running from the middle of one front to the middle of the other. Every owner of 5000 acres, beſides the above-mentioned privilege, is intitled to have an acre of ground in the front of his houſe, and all others may have half an acre, for gardens and court-yards. Every quarter of the city forms a ſquare of eight acres; and almoſt in the centre of it is a ſquare of ten acres, ſurrounded by the town-houſe and other public buildings. The high-ſtreet is 100 feet wide, and runs the whole length of the town: parallel to it run eight other ſtreets, which are croſſed by 20 more at right angles, all of them 30 feet wide, and communicating with canals from the two rivers, which add not only to the beauty, but the wholeſomeneſs of the city. Ships of 400 or 500 tons may come up to the key, which is 200 feet ſquare, and furniſhed with all the conveniences for ſhip-building, as well as for loading and unloading goods. Though the whole of this magnificent plan hath not yet been carried into execution, a conſiderable progreſs hath been made towards it. The town-houſe is ſo ſtately, ſpacious, and regular, that it would make a figure in any capital of Europe. The other public buildings are, the court-houſe, two Quakers meeting-houſes, one church of England, one Baptiſt meeting, one Dutch Lutheran church, one Dutch Calviniſt church, one Moravian church, one maſs-houſe, the Quakers ſchool-houſe, the city alms-houſe, the Quakers alms-houſe, the hoſpital, priſon, and work-houſe.

Philadelphia,
Philadelphus.

Philadelphia, an ancient town of Turky in Aſia, in Natolia; ſeated at the foot of mount Tmolus, from whence there is a fine view over an extenſive plain. The Greeks retain its ancient name, but by the Turks it is called *Allahijur*. It contains 7 or 8000 inhabitants; of whom 2000 are Chriſtians, who have four churches, over which preſides an archbiſhop. E. Lon. 28. 25. N. Lat. 38. 45.

PHILADELPHUS, the Pipe-tree, or *Mock-orange;* a genus of the monogynia order belonging to the icoſandria claſs of plants.

Species 1. The coronarius, white ſyringo, or mock-orange, has been long cultivated in the gardens of this country as a flowering ſhrub; it is not well known in what country it is to be found native. It riſes ſeven or eight feet high; ſending up a great number of ſlender ſtalks from the root. Theſe have a gray bark, branch out from their ſides, and are garniſhed with oval ſpear-ſhaped leaves. Theſe laſt have deep indentures on their edges; their upper ſurface being of a deep green, but the under ſurface pale, with the taſte of a freſh cucumber. The flowers are white, and come out from the ſides and at the ends of the branches in looſe bunches, each ſtanding on a diſtinct foot-ſtalk: they have four oval petals, which ſpread open, with a great number of ſtamina within, ſurrounding the ſtyle. Their ſmell at ſome diſtance reſembles that of orange-flowers, but is too powerful for moſt people when near. 2. The nanus, with oval leaves ſomewhat indented and double flowers, ſeldom riſes above three feet high; the flowers come out ſingly from the ſides of the branches, and have a double or treble row of petals of the ſame ſize and form as well as the ſame ſcent with the former; but this ſort flowers very rarely, ſo is but little eſteemed. 3. The inodorus with entire leaves, is a native of Carolina, and as yet but little known in Europe. It riſes with a ſhrubby ſtalk of about 16 feet in height, ſending out ſlender branches from the ſides oppoſite, garniſhed with ſmooth leaves ſharped like thoſe of the pear-tree, and ſtanding on pretty long foot-ſtalks. The flowers are produced at the ends of the branches; and are large, white, ſpreading open, with a great number of ſhort ſtamina with yellow ſummits.

Culture. The firſt two ſpecies are extremely hardy, but grow taller in light good ground than in ſuch as is ſtiff. They are uſually propagated by ſuckers, which are produced by the roots in great plenty. The The laſt ſpecies cannot be propogated in this country by ſeeds, which is the reaſon of its ſcarcity; however, it may be produced by laying down the branches. It is alſo liable to be deſtroyed by cold in ſevere winters, and therefore ought to be ſheltered during that ſeaſon.

PHILIPPI (anc. geog.), a town of Macedonia, in the territory of the Edones, on the confines of Thrace (Pliny, Ptolemy), ſituate on the ſide of a ſteep eminence; anciently called *Datum* and *Drenides* (Appian), though Strabo ſeems to diſtinguiſh them. This town was famous on ſeveral accounts; not only as taking its name from the celebrated Philip of Macedon, father to Alexander the Great, who conſidered it as a fit place for carrying on the war againſt the Thracians; but alſo on account of two battles fought in its neighbourhood between Auguſtus and the republican party. In the firſt of theſe battles, Brutus and Caſſius had the command of the republican army; while Octavianus, afterwards Auguſtus, and Mark Anthony, had the command of their adverſaries. The army of Brutus and Caſſius conſiſted of 19 legions and 20,000 horſe; the imperial forces of an equal number of legions, but more complete, and 13,000 horſe; ſo that the numbers on both ſides were pretty equal. The troops of Brutus were very richly dreſſed; moſt of them having their armour adorned with gold and ſilver; for Brutus, though very frugal in other reſpects, was thus extravagant with reſpect to his men, thinking that the riches that they had about them would make them exert themſelves the more, to prevent theſe from falling into the enemy's hands. Both the republican generals appear to have been inferior in ſkill to Mark Anthony; for as to Octavianus, he is allowed never to have conquered but by the valour of others. A little before the firſt engagement, Octavianus, who had been indiſpoſed, was carried out of the camp, at the perſuaſion of Artorius his phyſician, who had dreamed that he ſaw a viſion directing him to be removed. Brutus's men, who oppoſed the wing commanded by Octavianus, charged without orders, which cauſed great confuſion. However, they were ſucceſsful: for part of them, taking a compaſs about, fell upon the enemy's rear; after which they took and plundered the camp; making a great ſlaughter of ſuch as were in it, and, among the reſt putting 2000 Lacedemonians to the ſword who were newly come to the aſſiſtance of Octavianus. The emperor himſelf was ſought for, but in vain, he having been conveyed away for the reaſon abovementioned; and as the ſoldiers pierced the litter in which he was uſually carried, it was thence reported that he had been killed. This threw that whole part of the army into ſuch conſternation, that when Brutus attacked them in front, they were moſt completely routed; three whole legions being cut in pieces, and a prodigious ſlaughter made among the fugitives. But by the imprudence of the general in purſuing too far, the wing of the republican army commanded by Caſſius was left naked and ſeparated from the reſt of the army; on which they were attacked at once in front and in flank, and thus they were defeated and their camp taken, while Brutus imagined that he had gained a complete victory. Caſſius himſelf retired to an eminence at a ſmall diſtance from Philippi; whence he ſent one of his greateſt intimates to procure intelligence concerning the fate of Brutus. That general was on his way, and already in view, when the meſſenger ſet out. He ſoon met his friends; but they ſurrounding him to inquire the news, Caſſius, who beheld what paſſed, imagined that he was taken priſoner by the enemy, retired to his tent, and in deſpair cauſed one of his freedmen cut off his head. Thus far at leaſt is certain, that he went into the tent with that freedman, and that his head was found ſeparated from his body when Brutus entered. However, the freedman was never afterwards ſeen.

The ſecond engagement was pretty ſimilar to the firſt. Brutus again oppoſed Octavianus, and met with the ſame ſucceſs; but in the mean time Anthony, to whom he ought undoubtedly to have oppoſed himſelf, having to do only with the lieutenants of Caſſius, gained a complete victory over them. What was worſt, the fugitives, inſtead of leaving the field of battle altogether, fled for protection to Brutus's army; where, crowding in among the ranks, they carried deſpair and confuſion wherever they went, ſo that a total defeat enſued, and the republican army was almoſt entirely cut in pieces. After the battle, Brutus put an end to his own life, as is related more fully under the article ROME.

The city of Philippi is likewiſe remarkable on account of an epiſtle written by St Paul to the church in that place. It was a Roman colony, (Luke, Pliny, coin, inſcription). It is alſo remarkable for being the birth-place of Adraſtus, the peripatetic philoſopher, and diſciple of Ariſtotle.—The town is ſtill in being, and is an archbiſhop's ſee; but greatly decayed and badly peopled. However, there is an old amphitheatre, and ſeveral other monuments of its ancient grandeur. E. Long. 44. 55. N. Lat. 41. 0.

PHILIPPINE ISLANDS, certain iſlands of Aſia, lying between 114 and 131 degrees of eaſt longitude, and between 5 and 19 of north latitude, about 300 miles ſouth-eaſt of China. The chief of them are thoſe of Luconia or Manilla, Tandaga or Samar, Moſbate, Mindora, Luban, Paragoa, Panay, Leyte, Bohol, Sibu, Sogbu, Negros, St John, Xollo, and Mindanao. They were diſcovered by Ferdinand Magellan, a Portugueſe gentleman, who had ſerved his native country both in the wars of Africa and in the Eaſt Indies; particularly under Albuquerque, the famous Portugueſe general, who reduced Goa and Malacca to

Philippine. the obedience of that crown. Magellan, having had a conſiderable ſhare in thoſe actions, and finding himſelf neglected by the government of Portugal, and even denied, as it is ſaid, the ſmall advance of a ducat a month in his pay, left the court of Portugal in diſguſt, and offered his ſervice to Charles V. then emperor of Germany and king of Spain, whom he convinced of the probability of diſcovering a way to the Spice Iſlands, in the Eaſt Indies, by the weſt; whereupon, the command of five ſmall ſhips being given him, he ſet ſail from Seville, on the tenth of Auguſt 1519, and ſtanding over to the coaſt of South America, proceeded ſouthward to 52°, where he fortunately hit upon a ſtrait, ſince called the *Strait of Magellan*, which carried him into the Pacific Ocean or South Sea; and then, ſteering northward, repaſſed the equator; after which, he ſtretched away to the weſt, acroſs that vaſt ocean, till he arrived at Guam, one of the Ladrones, on the ſixth of March 1521; and ſoon after got to the Philippine Iſlands, which he took poſſeſſion of in the name of the king of Spain, but happened to be killed in a ſkirmiſh he had with the natives of one of them. His people, however, arrived afterwards at the Moluccas, or Clove Iſlands, where they left a colony, and returned to Spain, by the way of the Cape of Good Hope; being the firſt that ever ſailed round the globe. But there was no attempt made by the Spaniards to ſubdue or plant the Philippine Iſlands until the year 1564, in the reign of Philip II. ſon of Charles V. when Don Lewis de Velaſco, viceroy of Mexico, ſent Michael Lopez Delagaſpes thither with a fleet, and a force ſufficient to make a conqueſt of theſe iſlands, which he named the *Philippines*, in honour of Philip II. then upon the throne of Spain; and they have ever ſince been ſubject to that crown.

The inhabitants of theſe iſlands conſiſt of Chineſe, Ethiopians, Malays, Spaniards, Portugueſe, Pintados or Painted People, and Meſtees, a mixture of all theſe. Their perſons and habits reſemble thoſe of the ſeveral nations whence they derive their original; only, it is obſervable, that the features of the blacks of theſe iſlands are as agreeable as thoſe of the white people. There is not a ſoil in the world that produces greater plenty of all things for life; as appears by the multitude of inhabitants to be found in the woods and mountains, who ſubſiſt almoſt entirely by the fruits of the earth, and the veniſon they take. Nor can any country appear more beautiful; for there is a perpetual verdure, and buds, bloſſoms, and fruit, are found upon the trees all the year round, as well on the mountains as in the cultivated gardens. Vaſt quantities of gold are waſhed down from the hills by the rains, and found mixed with the ſand of their rivers. There are alſo mines of other metals, and excellent load-ſtones found here; and ſuch numbers of wild buffaloes, that a good huntſman on horſeback, armed with a ſpear, will kill 10 or 20 in a day. The Spaniards take them for their hides, which they ſell to the Chineſe; and their carcaſes ſerve the mountaineers for food. Their woods alſo abound with deer, wild hogs, and goats. Of the laſt, there is ſuch plenty in one of theſe iſlands, that the Spaniards gave it the name of *Cabras*. Horſes and cows have been likewiſe imported into theſe iſlands, from New Spain, China, and Japan, which have multiplied conſiderably; but the ſheep that were brought over came to nothing. The trees produce a great variety of gums; one kind, which is the commoneſt, by the Spaniards called *brea*, is uſed inſtead of pitch; of the others, ſome are medicinal, others odoriferous.

Philippines Philip.

In thoſe iſlands are monkeys and baboons of a monſtrous bigneſs, that will defend themſelves if attacked by men. When they can find no fruit in the mountains, they go down to the ſea to catch crabs and oyſters; and that the oyſters may not cloſe and catch their paws, they firſt put in a ſtone to prevent their ſhutting cloſe: they take crabs by putting their tail in the holes where they lie, and when the crab lays hold of it, they draw him out. There are alſo great numbers of civet-cats in ſome of the iſlands. The bird called *tavan*, is a black ſea-fowl, ſomething leſs than a hen, and has a long neck; it lays its eggs in the ſand by the ſea-ſide, 40 or 50 in a trench, and then covers them, and they are hatched by the heat of the ſun. They have likewiſe the bird *ſaligan*, which builds her neſt on the ſides of rocks, as the ſwallows do againſt a wall; and theſe are the delicious Birds-*Neſts* ſo much eſteemed, being a kind of jelly that diſſolves in warm water.

The Spaniards have introduced ſeveral of the American fruits, which thrive here as well as in America; the cocoa or chocolate-nut particularly, which increaſes ſo that they have no occaſion now to import it from Mexico. Here is alſo the Fountain-*Tree*, from which the natives draw water; and there is likewiſe a kind of cane, by the Spaniards called *vaxuco*, which, if cut, yields fair water enough for a draught, of which there are plenty in the mountains, where water is moſt wanted.

Theſe iſlands being hot and moiſt, produce abundance of venomous creatures, as the ſoil does poiſonous herbs and flowers, which do not kill thoſe who touch or taſte them, but ſo infect the air, that many people die in the time of their bloſſoming.

The orange, lemon, and ſeveral other trees, bear twice a-year. If they plant a ſprig, within a year it becomes a tree, and bears fruit; and therefore, without any hyperbole, ſays our author, I may affirm, that I never ſaw ſuch a luxuriant verdant ſoil, nor woods full of ſuch old, large, and lofty trees, nor trees that yield more ſuſtenance to man, in any part of the world. However, theſe iſlands, beſides the inconveniences mentioned above, are alſo ſubject to earthquakes, which are ſometimes very fatal.

The whole number of them is ſaid to be 1100.

Philippines, a religious ſociety of young women at Rome, ſo called from their taking St Philip de Neri for their protector. The ſociety conſiſts of 100 poor girls, who are brought up till they are of age to be married, or become nuns, under the direction of ſome religious women, who teach them to read, write, and work, and inſtruct them in the duties of Chriſtianity. They wear a white veil, and a black croſs on their breaſts. See Macedonia.

PHILIP II. king of Macedon, and father of Alexander the Great; equally renowned as a legiſlator, politician, and warrior. After having conquered Greece, he meditated the conqueſt of Perſia; but while he was preparing for this expedition, he was aſſaſſinated at a banquet by Pauſanias, a captain of his guards, in 336 B. C.

Philip II. king of Spain, a celebrated politician, but a cruel tyrant through bigotry, by which he loſt the 17 provinces of Flanders belonging to the crown of Spain, ſeven of which form the republic of Holland, and the other ten are ſubject to France and Auſtria. For his marriage with Mary queen of England, and his invaſion of England under Elizabeth, ſee the article England. He was born in the year 1527, and died in 1528.

PHILIPS (Ambroſe), an Engliſh poet, was deſcended from a very ancient and conſiderable family of that name in Leiceſterſhire. He received his education at St John's college, Cambridge; during his ſtay at which univerſity, he wrote his paſtorals, which acquired him at the time ſo high a reputation. His next performance was, *The life of Archbiſhop Williams*, written, according to Mr Cibber, to make known his political principles, which, in the courſe of it he had a free of opportunity of doing, as the archbiſhop, who is the hero of his work, was a ſtrong opponent to the high-church meaſures.

When he quitted the univerſity, and came to London, he became a conſtant attendant at, and one of the wits of, Button's coffee-houſe; where he obtained the friendſhip and intimacy of many of the celebrated geniuſes of that age, more particularly of Sir Richard Steele, who, in the firſt volume of his *Tatler*, has inſerted a little poem of Mr Philips's, which he calls a *Winter Piece*, dated from Copenhagen, and addreſſed to the earl of Dorſet, on which he beſtows the higheſt encomiums; and, indeed, ſo much juſtice is there in theſe his commendations, that even Mr Pope himſelf, who had a fixed averſion for the author, while he affected to deſpiſe his other works, uſed always to except this from the number.

The firſt diſlike Mr Pope conceived againſt Mr Philips, proceeded from that jealouſy of fame which was ſo conſpicuous in the character of that great poet; for Sir Richard Steele had taken ſo ſtrong a liking to the poſtorals of the latter, as to have formed a deſign for a critical compariſon of them with thoſe of Pope, in the concluſion of which the preference was to have been given to Philips. This deſign, however, coming to Mr Pope's knowledge, that gentleman, who could not bear a rival near the throne, determined to ward off this ſtroke by a ſtratagem of the moſt artful kind; which was no other than taking the ſame taſk on himſelf; and, in a paper in the Guardian, by drawing the like compariſon, and giving a like preference, but on principles of criticiſm apparently fallacious, to point out the abſurdity of ſuch a judgment. However, notwithſtanding the ridicule that was drawn on him in conſequence of his ſtanding as it were in competition with ſo powerful an antagoniſt, it is allowed, that there are, in ſome parts of Philip's paſtorals, certain ſtrokes of nature, and a degree of ſimplicity, that are much better ſuited to the purpoſes of paſtoral, than the more correctly turned periods of Mr Pope's verſification. Mr Philips and Mr Pope being of different political principles, was another cauſe of enmity between them; which aroſe at length to ſo great a height, that the former, finding his antagoniſt too hard for him at the weapon of wit, had even determined on making uſe of a rougher kind of argument; for which purpoſe he even went ſo far as to hang up a rod at Button's for the chaſtiſement of his adverſary whenever he ſhould come thither; which, however, Mr Pope declining to do, avoided the *argumentum baculinum*, in which he would, no doubt, have found himſelf on the weakeſt ſide of the queſtion. Our author alſo wrote ſeveral dramatical pieces; The Briton, Diſtreſſed mother, and Humphrey duke of Gloceſter; all of which met with ſucceſs, and one of them is at this time a ſtandard of entertainment at the theatres, being generally repeated ſeveral times in every ſeaſon. Mr Philip's circumſtances were in general, through his life, not only eaſy, but rather affluent, in conſequence of his being connected, by his political principles, with perſons of great rank and conſequence. He was concerned with Dr Hugh Boulter, afterwards archbiſhop of Armagh, the right honourable Richard Weſt, eſq; lord chancellor of Ireland, the reverend Mr Gilbert Burnet, and the reverend Mr Henry Stevens, in writing a ſeries of papers called the *Free Thinker*, which were all publiſhed together by Mr Philips, in three volumes in 12mo.

In the latter part of queen Anne's reign, he was ſecretary to the Hanover club, who were a ſet of noblemen and gentlemen who had formed an aſſociation in honour of that ſucceſſion, and for the ſupport of its intereſts, and who uſed particularly to diſtinguiſh in their toaſts ſuch of the fair ſex as were moſt zealouſly attached to the illuſtrious Houſe of Brunſwic. Mr Philips's ſtation in this club, together with the zeal ſhewn in his writings, recommending him to the notice and favour of the new government, he was, ſoon after the acceſſion of king George I. put into the commiſſion of the peace, and appointed one of the commiſſioners of the lottery. And, on his friend Dr Boulter's being made primate of Ireland, he accompanied that prelate acroſs St George's channel, where he had conſiderable preferments beſtowed on him, and was elected a member of the Houſe of Commons there, as repreſentative for the county of Armagh. At length, having purchaſed an annuity for life of 400 l. *per annum*, he came over to England ſome time in the year 1748; but having a very bad ſtate of health, and ing moreover of an advanced age, he died ſoon after, at his lodgings near Vauxhall, in Surry.

Philips (Catherine), a very ingenious lady, the daughter of Mr John Fowler merchant; was born at London, in January 1631, and educated at a ſchool at Hackney. She married James Philips of the priory of Cardigan, eſq. and went with the viſcounteſs of Dungannon into Ireland, where ſhe tranſlated Corneille's tragedy of Pompey into Engliſh, which was ſeveral times acted there with great applauſe. Her poems were firſt printed in the year 1664, tho' without her conſent; and after her death a ſmall volume of her letters to Sir Charles Cotterel, was publiſhed under the title of *Letters from Orinda to Poliarchus*. She died of the ſmall-pox in London, in June 1664. Beſides the above, ſhe tranſlated from the French of Corneille, part of the tragedy called *Horace*, which Sir John Denham completed by adding the fifth act; and ſoon after her death, her poems and tranſlations were publiſhed in a folio volume. This lady, who had few perſonal graces, was greatly admired for her abilities and many virtues; and was particularly eſteemed by ſeveral perſons of quality and diſtinction, amongſt whom were thoſe illuſtrious peers, the duke of Ormond, the earls of Orrery and Roſcommon, and Dr Taylor biſhop of Downe and Connor. Mr Dryden more than once mentions her with honour; and Mr Cowley wrote an excellent ode upon her death.

PHILIPS (John), an eminent Engliſh poet, was born in 1676. He was educated at Wincheſter and Oxford, where he became acquainted with Milton, whom he ſtudied with great application, and traced in all his ſucceſsful tranſlations from the ancients. The firſt poem which diſtinguiſhed our author, was his *Splendid Shilling*, which is in the *Tatler* ſtyled *the fineſt burleſque poem in the Engliſh language.* He wrote alſo a poem upon Cyder, founded on the model of Virgil's Georgics; which is an excellent performance in its kind: with ſeveral other pieces. He was beloved by all who knew him; ſomewhat reſerved and ſilent amongſt ſtrangers, but free, familiar, and eaſy with his friends. He died young, in 1708.

PHILISTÆA (anc. geog.), the country of the Philiſtines, (Bible); which lay along the Mediterranean, from Joppa to the boundary of Egypt, and extending to inland places not far from the coaſt. *Palæſtini*, the people; *Palæſtina*, the country; (Joſephus): Afterwards applied to the whole of the Holy Land and its inhabitants. *Philiſtæi*, the people, (Septuagint); *Philiſtini*, (Vulgate); the *Caphtorim* and *Philiſtim*, originally from Egypt, and deſcendants of Cham, (Moſes). Expelled and deſtroyed the Hivites the ancient inhabitants, and occupied their country; that is, the region which retained the name of *Philiſtim*, in which that of *Caphtorim* was ſwallowed up.

PHILLYREA, MOCK-PRIVET; a genus of the monogynia order, belonging to the diandria claſs of plants. There are ſeven ſpecies, all of them ſhrubby plants, natives of France and Italy, riſing from five to 18 or 20 feet high, adorned with ſmall cluſters of white or herbaceous flowers. They are very hardy, and will thrive in any ſoil or ſituation.

PHILO, a celebrated Jewiſh writer of the firſt century, was born of a diſtinguiſhed family at Alexandria, and was the chief of the deputation ſent by the Alexandrian Jews to the emperor Caligula againſt the Greek inhabitants of the ſame city, about the year 40. This deputation was without effect; Caligula gave him audience, heard him, and refuſed to grant his demands. Philo himſelf wrote a curious account of this embaſſy, under the title of, *A diſcourſe againſt Flaccus.* There are alſo extant ſeveral other of his works, divided into three parts; the firſt of which relates to the Creation of the World, the ſecond is on the Sacred Hiſtory, and the third on the Laws and Cuſtoms of the Jews; all of which are written in elegant Greek, and interſperſed with excellent moral ſentiments and allegories. Philo ſo cloſely imitated Plato's ſtyle and doctrines, that he has been ſurnamed the *Jewiſh Plato.* The beſt edition of his works is that of London, printed in 1742, by Dr Mangey, in Gr. and Lat. 2 vols folio.

PHILOCTETES, in fabulous hiſtory, the ſon of Pæan, was the faithful companion of Hercules; who at his death obliged him to ſwear not to diſcover the place where his aſhes were interred, and preſented him with his arrows dipped in the Hydra's blood. The Greeks at the ſiege of Troy, being informed by an oracle that they could never take that city without thoſe fatal arrows, went to Philoctetes, and inſiſted upon his diſcovering where he had left his friend; when Philoctetes, to evade the guilt of perjury, let them know where Hercules was intombed, by ſtamping upon the place: but he was puniſhed for the violation of his oath, by dropping an arrow upon that foot; which, after giving him great agony, was at length cured by Macaon. He was afterwards taken by Ulyſſes to the ſiege of Troy, where he killed Paris with one of his arrows.

PHILOLOGY.

UNDER the term PHILOLOGY, ſome comprehend univerſal literature; ſo that each one may there include whatever he thinks proper; as grammar, rhetoric, poetry, antiquities, hiſtory, criticiſm, the interpretation of authors, &c. This ſeems to be not only making an abuſe of words, but creating confuſion in thoſe matters where too much regularity and preciſion cannot be obſerved. The term *philology* is compoſed of the Greek words φιλο and λογος, which imply "a love or ſtudy of languages." It appears, therefore, that philology is nothing more than a general knowledge of languages, of the natural and figurative ſignification of their words and phraſes, and, in ſhort, of all that relates to expreſſion in the different dialects of nations, as well ancient as modern.

As, in treating of GRAMMAR, we have given thoſe general rules which are applicable to all poſſible languages; we ſhall here confine our obſervation to the languages themſelves, and to thoſe general ideas which philology offers, without leading our readers thro' all the paths of an immenſe labyrinth.

Languages in general may be divided into,

1. *Ancient languages;* which are thoſe that have become extinct with the people who ſpoke them, or have been ſo altered and diſfigured that they no longer reſemble the languages which were ſpoken by thoſe people.

2. *Oriental languages;* the ſtudy of which is neceſſary in order to the underſtanding of the text of the holy ſcriptures, eſpecially the Old Teſtament.

3. *Learned languages;* which are thoſe that are indiſpenſably neceſſary in the ſtudy of erudition, and particularly literature; which, while there were people in the world who made them their common language, were called *living;* but as no nation now makes uſe of them, they are called *dead languages,* and are therefore to be learned from books or in ſchools.

4. *Modern languages:* in which are diſtinguiſhed, firſt, the common languages of the European nations; and ſecondly, the languages of the people who inhabit the three other parts of the world.

SECT. I. *Ancient languages.*

I. OF the languages that were ſpoken by the firſt inhabitants of the world, till the deſtruction of the tower of Babel, there are not now the leaſt traces remaining; though ſome zealous theologians pretend that it was the Hebrew as it is found in the Bible, or at leaſt the ancient Chaldean: but all this is mere conjecture; and it is certain, on the contrary, that every veſtige of thoſe languages has been totally deſtroyed by time. The ancient languages that have been in uſe in the different parts of the world ſince that period, and the knowledge of which, more or leſs imperfect, has come down to us, are,

1. The Chaldean.
2. The Syriac and Eſtrangetic.
3. The Arabic.
4. Coptic or ancient Egyptian.
5. Ancient Ethiopian.
6. Ancient Indian.
7. Ancient Phœnician, which is alſo called the *Ionic Phœnician.*
8. Punic or Carthaginian.
9. Scythian, and the Scythian of the Huns.
10. Cyrillian.
11. Glagolitic.
12. Braminian or Brachmanian.
13. Æolian or Æolic.
14. Jacobitian.
15. Celtic.
16. Saracen.
17. Ancient Eſclavonian.
18. Gothic.
19. Hetruſcan.
20. Mangiurian; of which the Maronites, Neſtorians, and ſometimes the Jacobites, made uſe.
21. Hieroglyphic.
22. Runic.
23. Ancient Vandalian.
24. Ancient Germanic.

And perhaps ſome others that may be known to philologiſts. To theſe may be added,

25. The different alphabets, idioms, and methods of ſpeaking and writing in the middle age.

Philology is therefore employed in making learned reſearches, not only into theſe languages, but into many others, which we ſhall enumerate in the courſe of this article. It preſcribes rules, lays down precepts, points out principles, furniſhes etymologies, and makes all the neceſſary remarks for the underſtanding and attainment of every known language. It ſhows the uſe that may be made of each particular language; in what country, and by what people, it has been ſpoken; and explains, as far as is poſſible, all the obſcurities and ambiguities that attend the ſtudy of each language.

When the alphabet of a language is once diſcovered and well underſtood, we may eaſily attain, or at leaſt with much leſs difficulty, the knowledge of the reſt. Beſide numberleſs philological works, with which each library is crowded, they have, in Germany, a ſmall treatiſe that is very curious and very inſtructive, intitled, *The new A. B. C. in a hundred languages:* or, "Fundamental inſtructions for teaching the youngeſt ſcholars not only German, Latin, French, and Italian, but alſo the oriental and other languages, as well as the pronunciation and knowledge of theſe different languages:" Leipſic, publiſhed by Geſner, 1743. In this book are contained the alphabets and firſt elements of a hundred different languages, as well ancient as modern. This work was reprinted in 1740, and very conſiderably augmented, under the title of, *The maſter of the oriental and occidental languages.* To this has been added the Lord's prayer, in two hundred languages ancient and modern, in the characters proper to each, with the dialect or manner of pronouncing the prayer; which contributes greatly to facilitate the attaining an idea of theſe languages. The author of this equally curious and inſtructive book is M. John Frederic Frits; and he was aſſiſted by the Daniſh miſſionary Schults of Hall. The ſucceſſors of Homann of Nurenburg have alſo publiſhed four geographico-philological maps, deſigned by Godfrey Henſel, which bear the following titles: 1. *Europa polyglotta, linguarum genealogiam exhibens, una cum litteris ſcribendique modis omnium gentium:* 2. *Aſia;* 3. *Africa,* with the ſame title: and, 4. *America, cum ſupplementis polyglottis.* The four parts of the world are engraved and coloured on theſe maps; but in every country, inſtead of the names of its cities and provinces, is ſeen the beginning of the Lord's prayer, in the characters uſed in that country; ſo that, with a ſingle glance of the eye, we ſee all the languages that are in uſe in all parts of the known world. Theſe maps are highly curious, and have doubtleſs coſt the inventors immenſe labour.

Books which teach the particular rules of a language called *grammars, rudiments,* &c.; and thoſe that contain the words and phraſes, *dictionaries, lexicons, lexical manuals, vocabularies,* &c. Philology ſhews the manner in which theſe books are to be made, and the precautions that are to be obſerved to render them inſtructive and agreeable; the method of treating ſynonymous terms, the gradations that are among words ſeemingly ſynonymous, and many other like matters. It ſhews alſo the reciprocal influence which the genius and manners of a people have on their language; and their language on their general method of thinking; their manners, urbanity, and refinement.

But as it is impoſſible to perceive all the force and elegance of the various alluſions, metaphors, and compariſons in a language, eſpecially in an ancient language, if we are not properly inſtructed in their manners, cuſtoms, ceremonies, laws, arts, ſciences, and profeſſions, and other peculiarities of the nation by whom they have been uſed, and whoſe natural idiom they formed, Philology, in order to know the true origin, etymology, and ſignification of the words, terms, and phraſes of a language, remounts to the moſt diſtant ages, and, employing all the aids it can receive from literature, it makes uſe of antiquities, numiſmatics, and diplomatics, in fixing the meaning of each term and mode of expreſſion, and by theſe means renders languages and authors intelligible, clear, and agreeable.

Theſe languages, which are no longer in common uſe, can only be learned by books or manuſcipts. But as theſe have come down to us by the means of copying, they have conſequently been frequently mutilated, altered, diminiſhed and diſfigured, by thoſe who have copied them; the text, in general, or at leaſt many paſſages of theſe books and manuſcripts, is unintelligible at the firſt reading. From hence there has ariſen in modern Europe a particular ſcience, that is called the *Criticiſm of Languages*, which makes a part of philology, and is employed, 1. In examining the authenticity and truth of the text; 2. In diſcovering and pointing out the means of correcting the text; 3. In reſtoring ſuch paſſages as have been altered, omitted, or mutilated; 4. In explaining the true ſenſe of the text; and, 5. In eſtabliſhing a language by theſe means in its full primitive perfection, and making it perfectly intelligible to modern times. The celebrated M. le Clerc has given us an admirable work on this ſubject, intitled *Ars Critica*, in which he explains, with equal genius and ſolidity, the rules of ſound philological criticiſm.

That which is of the greateſt uſe in underſtanding and interpreting an obſcure or imperfect paſſage, or an unintelligible word or phraſe, is *confrontation*. The beſt confrontation is that which is made by comparing an author, book, or manuſcript, with itſelf; by examining if the ſame word, matter, or phraſe, is not repeated elſewhere, or in equivalent expreſſions. This is the moſt certain method, and produces an authentic interpretation. The ſecond method is to confront a writer with his cotemporaries of the ſame nation: and the third conſiſts in comparing him with other authors who have written at different times, and in the ſame language.

SECT. II. *Oriental Languages.*

THOUGH moſt of the languages we have enumerated in the preceding ſection, and many of thoſe we ſhall mention in the fourth, have been, or are ſtill, in uſe in the eaſtern countries, we here underſtand, however, by the term *orential*, thoſe only which are eſſentially neceſſary to the underſtanding, and interpreting, in an exegetic manner, the holy writings, eſpecially thoſe of the Old Teſtament; and for this reſtriction of the term we have the authority of a great number of learned men, who by the oriental languages underſtand only the Hebrew, Chaldean, Syriac, Arabic, and Coptic: to which we ſhall add the Samaritan, Rabbinic, and Talmudic. Theſe eight languages merit a more particular examen, as they ſerve to eſtabliſh the foundations of the Chriſtian religion, and make a conſiderable part of the ſtudy of a Theologian.

I. The Hebrew, Arabic, and Chaldean, reſpectively claim the right of ſeniority: each of them has its advocates; and the point is not eaſy to be decided. Moſt zealous divines are inclined to favour the Hebrew; and there are ſome of them who pretend that it was the language in which God talked with Adam in paradiſe, and that the ſaints will make uſe of it in heaven in thoſe praiſes which they will eternally offer to the Almighty. Theſe doctors ſeem to be as certain with regard to what is paſſed as what is to come. Some philologiſts give the priority to the Arabic, and others to the Chaldean. This difference is the more difficult to be reconciled, as Moſes was not born till 2464 years after the creation, and in Egypt; that is to ſay, 700 years after the deſtruction of the tower of Babel, when all languages were mixed and confounded; for we have no proof, nor even any account, that the Hebrew was exempted, and preſerved its purity amidſt the general confuſion. There is not, moreover, at this time, any one work of antiquity exiſting that is wrote in Hebrew, except the Old Teſtament; and of that there are even ſome parts in Chaldaic; and words of that and other languages are to be found diſperſed in different parts of it.

There is one more remark we muſt here make. The firſt time we find the word *Hebrew* in the Bible, is in the 13th verſe of the xivth chapter of Geneſis; and it is manifeſt that Abraham and his deſcendants took that name from the patriarch *Heber*, the ſon of Salah, and third grandfather of Abraham: it is therefore evident, that in the time of Abraham this name was that of a family, and not of a people who had a ſeparate language. We are therefore to ſuppoſe, that Abraham, and the patriarchs after him, ſpoke the cuſtomary language of the country where they lived: that this language changed by degrees, as all living languages have done and ever will do: that Jacob and his ſons having paſſed into Egypt, they and their deſcendents, under the name of the *Children of Iſrael*, did not preſerve the language of their fathers in all its purity; but that they mixed with it many expreſſions borrowed from foreign languages, and eſpecially from the Egyptian and Coptic: that Moſes wrote in the Hebrew language, as the children of Iſrael then ſpoke it: that the other books of the Old Teſtament were wrote ſtill later; and that it is almoſt impoſſible for this language to have been preſerved without any alteration.

As we have no Hebrew but what is contained in the Holy Bible, this language muſt naturally be deficient of many words; not only becauſe all the ancient languages, but eſpecially thoſe of the firſt ages, were not ſo copious as the modern; but there were in thoſe times fewer objects to be named; and the ſacred authors moreover had not occaſion to treat on all ſubjects. The Hebrew language, however, is ſuſceptible of all the ornaments of diction, and is very expreſſive. It is not, beſide, ſo difficult to learn as ſome have imagined. The ſtyle of the Pſalms, of the book of Job, and of all that is written in a poetic manner, is the moſt difficult to underſtand. That of Iſaiah is noble and elegant, worthy of an author who was of the houſe of David, and the nephew and grandſon of a king. But, notwithſtanding all the labours of the learned for ſo many centuries, we are very far from having a perfect knowledge of the Hebrew language: this inconvenience is the greater, as it gives occaſion to many imperfect tranſlations, which disfigure the true ſenſe of the original text; and, what is ſtill more, they have founded, on theſe paſſages wrong interpreted, a belief of events that have never arrived in the manner predicted; and even ſometimes religious dogmas.

The Hebrew language had originally no vowels. They are marked in the maſſorets by points under the conſonants. This language is written and read from the left to the right: it has thirteen letters, which grammarians divide into guttural, palatic, dental, labial, and gingival. They now diſtinguiſh only five vowels in Hebrew, which are the ſame as ours, *a*, *e*, *i*, *o*, *u*. But they divide each vowel into two or three; as *long*, *ſhort*, *ſhorteſt*. The articles, pronouns, &c. are placed after the ſubſtantive; and the ſame word is ſometimes ſubſtantive, adjective, and verb. The punctuation and accent are the objects that require the greateſt attention in the Hebrew language: they count near forty accents; and there are many whoſe uſe is ſtill unknown. They ſerve in general to diſtinguiſh, 1. The period and its members, as the points do in other languages; 2. To determine the quantity of ſyllables; and, 3. To mark the tone that is to be obſerved in chanting them. Nineteen of theſe accents are alſo called, by grammarians, *diſtinctivi* or *accentus regii*; and the others *conjunctivi*, *ſervi*, or *miniſtri*. There is, properly ſpeaking, only one conjugation in this language, which is of itſelf ſimple, but is varied in each verb by ſeven or eight different manners, that form in fact ſo many different conjugations, and give a great number of expreſſions, to repreſent by one word the various modifications of a verb. Theſe are the principal characteriſtics of the Hebrew, as we find it in the Holy Scriptures; and which, taken all together, forms a very regular and analogous language.

II. The *Chaldean* is that which was ſpoken in Chaldea. Some ſay that it is a dialect derived from the Hebrew, and others that the Hebrew is a dialect of the Chaldean. This language has twenty-five letters; the forms of which are very different from the Hebrew. It is in like manner wrote from the left to the right.

The *Syriac* is alſo conſidered as a dialect of the Hebrew. It has twenty-two letters, which have the ſame names with the Hebrew, but are of very different forms.

The *Arabic*, or the language of the Arabians, is in like manner a dialect of the Hebrew. It has twenty-eight letters, the names of which have a good deal of reſemblance to the Hebrew; but their characters are alſo very different.

The *Coptic* is the ancient language of the Egyptians, but mixed in proceſs of time with much of the Greek. We have already ſaid, in the preceding ſection, that the late M. de la Croſe has in a manner re-eſtabliſhed this language, when we ſcarce knew more than the name of it; and that he has compoſed a Coptic grammar and dictionary. F. Kircher, it is true, had before publiſhed a Coptic vocabulary and kind of grammer, but very incomplete. There are thirty-two letters in its alphabet, but the characters are almoſt entirely Greek. There has been no book found in this language but tranſlations of the Holy Scriptures, or eccleſiaſtic offices, &c.

III. The *Samaritan* is another dialect of the Hebrew. The Samaritans were Jews, and their city Samaria was in Judea. They followed the law of Moſes with more rigour, more after the letter than the Hebrews. There is a Samaritan copy of the Pentateuch, which differs indeed but little from that of the Jews in Hebrew: but it is written in different characters, that are commonly called *Samaritan*; and which Origen, St Jerom, and many other writers, as well ancient as modern, ſuppoſe to be the firſt letters of the Hebrews. There are alſo medals that are called *Samaritan*; they have Hebrew inſcriptions, in characters different from thoſe of our Hebrew Bible, and which are called *ſquare Hebrew*. For a further account of the Samaritan language, conſult M. Simon in his cuſtoms and ceremonies of the Jews, Eduardi Bernhardi Lexicon Samaritanum, F. Kircher, M. Buxtorff, M. de Spanheim, F. Morin, M. Walton, and a great number of others writers.

IV. The *Rabbinic*, or the Hebrew of the Rabbins, is the language of which they have made uſe in their works. The body of it is compoſed of Hebrew and Chaldaic, with divers alterations in the words of thoſe two languages, whoſe ſignifications they have much extended. They have likewiſe borrowed greatly from the Arabic. The reſt is compoſed of words taken for the moſt part from the Greek, with ſome from the Latin, and others from various modern languages, eſpecially that of the country in which each rabbin lived. For we ſhould remember here, that after the return from the laſt captivity, they ſpoke ſcarce any pure Hebrew at Jeruſalem and in Judea, but Greek mixed with ſome Hebraic expreſſions: the Romans afterward entering Paleſtine, and becoming conquerors of that country, ſpoke their own language there; and at laſt the Jewiſh nation was totally diſperſed. We ſhall only add, that the Rabbinic is a very copious language; and that there is ſcarce any part of ſcience of which the Rabbins have not treated, but always with an enthuſiaſm that is natural to them: there have been among them even poets and orators.

V. The *Talmudic* is another dialect or particular idiom of the Hebrew, in which the Talmud, or the book compoſed by the Jews, that contains all the explications of their law, is written. This language differs greatly from the pure Hebrew. M. Buxtorff has compoſed a Chaldaic, Talmudic, and Rabbinic dictionary. We have alſo a work of the emperor Conſtantine, intitled *Clavis Talmudica*; and one of Otto, called *Vitæ doctorum miſnicorum*; beſide ſeveral others.

SECT III. *Of thoſe Languages that are called dead.*

LANGUAGES in general, properly ſpeaking, form no ſcience that can enrich the mind with real knowledge, but are to be conſidered as introductions to the ſciences; as keys that open to us the ſanctuaries of erudition. In order to attain the knowledge of antiquity in its full extent, the knowledge of thoſe languages that were then in uſe is of great utility: and properly to judge of modern nations, it is almoſt indiſpenſably neceſſary to be acquainted with the principal languages which are now uſed in the world. There are two languages, however, which are called *learned* by way of eminence, and thoſe are the Greek and the Latin. The former of theſe not only enables us to read the maſterly productions of genius of ancient Greece, but alſo to form a true judgment of all its antiquities, and of its different ages, which form the moſt entertaining and intereſting periods for the ſciences and polite arts of all ancient times. The latter affords us the means of underſtanding the original texts of all the admirable works of the moſt celebrated Latin authors, and of becoming acquainted with the city, republic, and monarchy of Rome, as if we had been preſent with them; and of forming a ſolid judgement of thoſe precious Roman antiquities of every kind that are ſtill remaining among us.

But that which has given the Latin an advantage even over the Greek itſelf, that has rendered it indiſpenſable to every man of letters, and has made it the baſis of erudition, is, that during the middle age, and in general in all modern times, the learned of all Europe have made it their common and univerſal language; ſo that the Latin forms, if we may uſe the expreſſion, the natural language of the ſciences.

I. All that is written in *Greek* cannot be properly ſaid to be in the ſame language; for we ſhould carefully diſtinguiſh,

(1.) The ancient or literal Greek: an admirable language, in which are written the works of Xenophon, Thucydides, Demoſthenes, Plato, Ariſtotle, Homer, Sophocles, &c. works that have preſerved this language in all its purity, and that will make it, with themſelves, immortal. There are, however, ſeveral idioms or dialects in this tongue, among which four are reckoned principal; and theſe are, 1. The Attic, which is the moſt eſteemed; 2. The Ionic; 3. The Æolic; and, 4. The Doric; which was a kind of ruſtic dialect, and in which are written eclogues, idyls, and other paſtorals. We muſt obſerve by the way, that all theſe four dialects are to be fouud in Homer, and produce an odd effect in an heroic poem, notwithſtanding the univerſal approbation that is given to this poet. The Greek language is very copious in words, and its inflexions are as various as they are ſimple in moſt modern languages. It has three numbers; the ſingular, dual, and plural; and many tenſes in its verbs, which afford great variety of expreſſion. The uſe of the participles of the aoriſt, and of the preterite, and of compound words, which are very numerous in this language, give it force and brevity, without in the leaſt diminiſhing its perſpicuity. Proper names have alſo a meaning in this as in the oriental languages; and the learned there find likewiſe the character of their origin. The dialect itſelf, or the pronunciation, is ſonorous, ſoft, harmonious, and delightful: in a word, the Greek is the language of a polite nation, that had a taſte for all the arts and ſciences.

(2) The Greek of the middle age. The ancient Greek ended at the time that Conſtantinople became the capital of the Roman empire; though there were after that time ſeveral works, and ſome by the fathers of the church, which were wrote in Greek, and with ſufficient purity: but as theology, law, civil and military policy, the alteration of cuſtoms and manners, &c. introduced ſucceſſively a great number of words that were before unknown, theſe novelties by degrees altered and corrupted the language. The natural elegance of the ancient Greek was no longer to be found. Thoſe men of exalted genius, who conſtantly give a true beauty to a language, were no more. And what could be expected from a barbarous age, and from authors that were even below a moderate capacity?

(3.) The modern or vulgar Greek. It commenced at the taking of Conſtantinople by the Turks, and is the language that is now commonly ſpoke in Greece, without any regard to improvement. The wretched ſtate to which the Greeks are reduced by the Turks, renders them indolent, and, by a neceſſary conſequence, ignorant. The policy of the Ottoman Porte does not permit its ſubjects to apply themſelves to ſtudy; and that ſame ſpirit which has deſtroyed the fineſt monuments of antiquity, which has made, of columns of porphyry and granate, balls for their cannons, has cauſed the decadency and total deſtruction of the ſciences. The principal difference between the ancient and vulgar Greek conſiſts in the terminations of their nouns, pronouns, verbs, and other parts of ſpeech. There are alſo in the modern many words that are not to be found in the ancient Greek; particles that appear to be expletives, and which cuſtom alone has introduced to diſtinguiſh certain tenſes of their verbs; names of employments and dignities unknown to the ancient Grecians, and a great number of words taken from modern tongues: which altogether form a ſpurious language, a kind of jargon. There is a gloſſary of this language compoſed by du Cange.

(4.) The Greek of the New Teſtament. The Greek of the Evangeliſts and Apoſtles is very different from that of Thucydydes, Xenophon, and Demoſthenes. At the time of the birth of our Saviour, Greek was commonly ſpoken in Judea; for after the laſt captivity, the people no longer underſtood Hebrew: their Greek, however, was corrupted; mixed with a great number of Hebraiſms; with words and terms that related to the worſhip, to the laws, policy, manners, and cuſtoms of the Jews; by which means it became a vulgar language, a provincial and rude dialect, in compariſon of the ancient or literal Greek. He that underſtands the New Teſtament, will not in conſequence underſtand Homer. It may appear ſurpriſing, that Joſephus, the Jewiſh hiſtorian, who lived at the time of the deſtruction of Jeruſalem, about 40 years after the death of Chriſt, ſhould be able to write Greek with ſo much purity and elegance: but he was at once a courtier, a miniſter, a general, and a man of letters; had ſtudied the Greek language, and had ſpoken it at the court of Veſpaſian in Rome. For the ſame reaſon, St Paul alſo wrote better Greek than the Evangeliſts and other Apoſtles.

From all that has been ſaid, it is apparent how much utility attends the ſtudy of the Greek tongue, and how much reaſon the Engliſh have for applying themſelves to it from their early youth. There are, moreover, in modern languages, an infinity of terms in the arts and ſciences, as moſt of thoſe in aſtronomy, mathematics, phyſic, anatomy, botany, and the names of many machines, inſtruments, and other modern inventions, that are either altogether Greek, or derived from it; which renders this language in a manner indiſpenſable to a man of real learning. We cannot, laſtly, determine if modern nations pronounce the Greek language in the manner that the ancient inhabitants of Greece did; but it is very probable, that if Demoſthenes or Ariſtides were now to come upon the earth, they would be very far from underſtanding what our learned men ſhould ſay to them in Greek.

II. The *Latin* is the ſecond of thoſe languages that are called dead. It was firſt ſpoke in Latium, afterwards at Rome; and by means of the Latin church, and of the labours of the learned, has come down to us. The Latin is not an original tongue; but is formed of the Greek, and eſpecially of the Æolian dialect, and of many words taken from the languages of the Oſci, the Hetrurians, and ſeveral other ancient nations of Italy. It has had different periods of improvement and decadency, which form its different ages.

1. The firſt age comprehends the ancient Latin that was ſpoke in Latium, and cultivated at Rome from its firſt foundation, under the reigns of its kings, and in the firſt ages of its republic. At the beginning, the Latin tongue was, ſo to ſay, incloſed within the walls of Rome; for the Romans did not commonly permit the uſe of it to their neighbours, or the people they conquered: but when they came to perceive how neceſſary it was for facilitating their commerce, that the Latin tongue ſhould be ſpoken every where, and that all nations in ſubjection to their empire ſhould be united by one common language, they then obliged thoſe they conquered to adopt their language. It is eaſy to conceive what muſt have been the original language of a ſet of freebooters, without manners, and without arts or ſciences: this jargon muſt beſide have been neceſſarily mixed with the language of the Sabines, from whom they ſtole their wives, and with thoſe of ſeveral other foreign nations whom they had conquered, or who were incorporated with their republic. But in proportion as the Romans became poliſhed, their language became refined. There are but very few works of the firſt age now remaining; among which are reckoned thoſe of Ennius, &c.

2. The ſecond age of the Latin language began about the time of Cæſar, and ended with Tiberius. This is what is called the *Auguſtan age*, which was perhaps of all others the moſt brilliant. A period at which it ſhould ſeem as if the greateſt men, and the immortal authors, had met together upon the earth, in order to write the Latin language in its utmoſt purity and perfection. This age, and the language of this age, are ſo well known, and we have ſo great a number of works produced at this period, as makes it unneceſſary for us to ſay any thing further of it here.

3. The third age begins with the reign of Tiberius. Seneca ſeems to have contributed not a little to have deprived the Latin language of its energy and dignity, and to have ſubſtituted the little tricks of ſtyle in its ſtead, and ſometimes thoſe childiſh expreſſions which the Italians call *concetti*. Even Tacitus appears not to have been quite free from theſe faults; for his conciſe and ſententious ſtyle is not that of the golden age; nor likewiſe is that of the poet Lucian.

4. The fourth age of the Latin tongue is that of the remainder of the middle age, and the firſt centuries of modern times; during which this language fell by degrees into ſo great a decadency, that it became nothing better than a barbarous jargon. It is to the ſtyle of theſe times that is given the name of *low Latin*; and in fact it was ſo corrupted, altered, and mixed with foreign expreſſions, that M. du Cange has formed a voluminous gloſſary, which contains thoſe words and phraſes only that are uſed in the Low Latin, and which we ſhould not be able to underſtand without ſuch helps. What indeed could be expected from this language, at a time when the barbarians had taken poſſeſſion of all Europe, but eſpecially of Italy; when the empire of the Eaſt was governed by idiots; when there was a total corruption of morals; when the arts and ſciences were in a manner annihilated; when the prieſts and monks were the only men of letters, and were at the ſame time the moſt ignorant and futile mortals in the world. Under theſe times of darkneſs, we muſt therefore rank that Latin which is called *lingua eccleſiaſtica*, and which we cannot read without diſguſt.

5. The fifth and laſt age of the Latin tongue is that which began with the 16th century, and was that of Leo X. Charles V. Francis I. Henry VIII. of England, &c. A happy period, and ever memorable for the reſtoration of letters, of arts and ſciences, of manners, and of the powers of the human mind, which till then ſeemed to have remained in a perpetual ſtupor. It is neceſſary to remember here, that the art of printing was not invented till about the year 1441; and that the manuſcripts of the ancient Greek and Latin authors were become extremely ſcarce, and highly valuable; ſo that but few private perſons were able to procure them, and to ſtudy the Latin of the Auguſtan age. But ſince that time we have had many Latin works, as well in verſe as proſe, in a ſtyle that we cannot ſufficiently admire, and which, though not altogether ſo pure and elegant as thoſe of the golden age, yet are not much inferior.

There are, however, in the Latin, and in all dead languages, two great inconveniences which continually attend them with regard to modern ages. The firſt conſiſts in the pronunciation. As to what concerns the Latin, each nation pronounces it after the manner of its own language, and each of them imagines their pronunciation to be the beſt. It may be proved, however, by many arguments, that no man now upon earth pronounces Latin in the ſame manner as did Horace and Cicero. The ſecond inconvenience is the deficiency of the Latin language with regard to us, as it has not terms whereby to expreſs thoſe inventions and diſcoveries of every kind that have been made ſince the exiſtence of the Roman empire. There are no Latin words for any of the furniture that ſurrounds us, for three-fourths of the diſhes that come upon our tables, for the dreſs we wear, for our inſtruments of war and navigation, for civil and military employments, and, in a word, for all our daily occupations. It is droll enough to hear our authors call a cannon *bombarda*; a peruke, *capilamentum*; and a button of our cloaths, *globulus*, &c. Whoever ſhall doubt the propriety of this obſervation, need only read the eſſays that ſome able Latiniſts have made in our days to write gazettes in that language, and they will there ſee the pains thoſe writers have taken, and the ill ſucceſs they have had. We ſhall ſay no more of a language which every ſcholar learns from his infancy, which is taught over all Europe in ſchools and colleges, and of which there are grammars, dictionaries, and other inſtructive books without number.

SECT. IV. *Modern Languages.*

IF we call all the different dialects of the various nations that now inhabit the known earth, languages, the number is truly great; and vain would be his ambition who ſhould attempt to learn them, though but imperfectly. We will begin with naming the principal of them: There are three which may be called original, or mother-languages, and which ſeem to have given birth to all that are now ſpoken in Europe. Theſe are the *Latin*, *German*, and *Sclavonian*. From the Latin are derived the languages of all thoſe nations which inhabit the ſouthern and moſt weſtern countries of this part of the world. From the German, all thoſe of the nations that inhabit the centre and the northern regions; and from the Sclavonian, all the languages of the people who dwell in the moſt eaſtern part of Europe. The Sclavonian is extended even to Aſia, and is ſpoken from the Adriatic ſea to the northern ocean, and almoſt from the Caſpian ſea to Saxony. But it muſt not be imagined from the term *original*, which is given to theſe languages, that they have come down to us from the confuſion at Babel without any alteration. No; we have already ſhown, in the preceding ſection, of what languages the Latin was formed. With regard to the German, it may be very juſtly ſuppoſed to have been the ancient language of the inhabitants of Germany, as the names of their divinities and heroes (*Mann*, *Erta*, *Hermann*, &c. appellative names; which ſtill ſignify "man, earth, chief of an army," &c.) ſeem to confirm that opinion. But it is indubitable, that the ancient German has been mixed and corrupted by the languages of thoſe northern nations which in the fourth century deluged Europe; and who, when they penetrated Italy and Africa, did not merely paſs through Germany as an army that marches in regular order, but remained there a conſiderable time, and mixed with the natives of the country. All theſe Scythian or Celtic people acquired likewiſe in Germany the name of *Allamands*, or "Germans:" ſome were called *Goths*, that is, "good;" others *Quades*, or "bad;" others *Huns*, or "dogs;" others *Normans*, or "men from the north;" and ſo of the reſt. And thoſe nations were from that time known and diſtinguiſhed by theſe denominations.

I. With regard to the Sclavonian, it is ſuppoſed to be in part the ancient language of the Celtes or Scythians, mixed with ſome particular dialects of different eaſtern nations. But be that as it may, theſe three languages appear to have produced the following modern tongues:

From the *Latin* came,

1. The Portugueſe.
2. Spaniſh.
3. French.
4. Italian.

From the *German* or *Allamand*,

5. The modern German; which ſo little reſembles the ancient, that it is with difficulty we read the authors of the 14th century.
6, The low Saxon or low German.
7. The Dutch.
8. The Engliſh; in which almoſt all the noun-ſubſtantives are German, and many of the verbs French, Latin, &c. and which is enriched with the ſpoils of all other languages.
9. The Daniſh.
10. The Norwegian.
11. Swediſh.
12. Dalecarlian.
13. Laplandiſh.

From the *Sclavonian*,

14. The Poloneſe, with a mixture of the ancient Sarmatian.
15. The Lithuanian.
16. Bohemian.
17. Hungarian.
18. Tranſylvanian.
19. Moravian.
20. The modern Vandalian, as it is ſtill ſpoken in Luſatia, Pruſſian Vandalia, &c.
21. The Croatian.
22. The Ruſſian or Muſcovite.
23. The language of the Calmacs and Coſſacs.
24. Thirty-two different dialects of nations who inhabit the north-eaſtern parts of Europe and Aſia, and who are deſcended from the Tartars and Huno-Scythians. There are polyglott tables which contain not only the alphabets, but alſo the principal diſtinct characters of all theſe languages.

To all theſe may be added,

25. The modern Greek, or that which is now ſpoken in Greece.
26. The modern Hebrew, or vulgar language of the Jews, which is alſo called the *German Hebrew*, &c. And,
27. The jargon that is called *Lingua Franca*.

II. The common languages of Aſia are,

28. The Turkiſh and Tartarian, with their different dialects.
29. The Perſian.
30. The Georgian or Iberian.
31. The Colchic or Mingralian.
32. The Albanian or Circaſſian.
33. The Armenian.

These languages are ſpoke by the Greek Chriſtians in Aſia, under the patriarch of Conſtantinople.

34. The language of the Jews in Perſia, Media, and Babylon.
35. The modern Indian.
36. The Formoſian.
37. The Indoſtanic.
38. The Malabarian.
39. The Warugian.
40. The Talmulic or Damulic.

The Daniſh miſſionaries who go to Tranquebar, print books at Hall in theſe languages.

41. The modern Arabic.
42. The Tangutian.
43. The Mungalic.
44. The language of Balabandu, and the Nigarian or Akar Nigarian.
45. The Gruſinic or Gruſinian.
46. The Chineſe.
47. The Japoneſe.

We have enumerated here thoſe Aſiatic languages only of which we have ſome knowledge in Europe, and even alphabets, grammars, or other books that can give us information concerning them. There are doubtleſs other tongues and dialects in thoſe vaſt regions and adjacent iſlands; but of theſe we are not able to give any account.

III. The principal languages of Africa are,

48. The modern Egyptian.
49. The Fetuitic, or the language of the kingdom of Fetu.
50. The Moroccan; and,
51. The jargons of thoſe ſavage nations who inhabit the deſart and burning regions. The people on the coaſt of Barbary ſpeak a kind of Turkiſh. To theſe may be added the Chilhic language, otherwiſe called *Tamazeght*; the Negritian, and that of Guinea;

Modern Languages.

Guinea; the Abyſſinian; and the language of the Hottentots.

IV. The languages of the American nations are but little known in Europe. Every one of theſe, tho' diſtant but a few days journey from each other, have their particular language or rather jargon. The languages of the Mexicans and Peruvians ſeem to be the moſt regular and poliſhed. There is alſo one called *Poconchi* or *Pocomana*, that is uſed in the bay of Honduras and toward Guntimal, the words and rules of which are moſt known to us. The languages of North America are in general the Algonhic, Apalachian, Mohogic, Savanahamic, Virginic, and Mexican: and in South America, the Peruvian, Caraibic, the language of Chili, the Cairic, the Tucumanian, and the languages uſed in Paraguay, Braſil, and Guiana.

V. We have already ſaid, that it would be a vain and ſenſeleſs undertaking for a man of letters to attempt the ſtudy of all theſe languages, and to make his head an univerſal dictionary of languages; but it would be ſtill more abſurd in us to attempt the analyſis of them in this place: ſome general reflections therefore muſt here ſuffice. Among the modern languages of Europe, the French ſeems to merit great attention; as it is elegant and pleaſing in itſelf; as it is become ſo general, we may travel from one end of Europe to the other without ſcarce having any occaſion for an interpreter; and as in it are to be found excellent works of every kind, both in verſe and proſe, uſeful and agreeable. There are, beſides, grammars and dictionaries of this language which give us every information concerning it, and very able maſters who teach it; eſpecially ſuch as come from thoſe parts of France where it is ſpoke correctly; for with all its advantages, the French language has this inconvenience, that it is pronounced ſcarce any where purely but at Paris and on the banks of the Loire. The language of the court, of the great world, and of men of letters, is moreover very different from that of the common people: and the French tongue, in general, is ſubject to great alteration and novelty. What pity it is, that the ſtyle of the great Corneille, and that of Moliere, ſhould already begin to be obſolete, and that it will be but a little time before the inimitable *chefs d'œuvres* of thoſe men of ſublime genius will be no longer ſeen on the ſtage! The moſt modern ſtyle of the French, moreover, does not ſeem to be the beſt. We are inclined to think, that too much conciſion, the epigrammatic point, the antitheſis, the paradox, the ſententious expreſſion, &c. diminiſh its force; and that by becoming more poliſhed and refined, it loſes much of its energy.

VI. The German and Italian languages merit likewiſe a particular application; as does the Engliſh, perhaps above all, for its many and great excellencies, (ſee LANGUAGE.) Authors of great ability daily labour in improving them; and what language would not become excellent, were men of exalted talents to make conſtant uſe of it in their works? If we had in Iroquois, books like thoſe which we have in Engliſh, Italian, French, and German, ſhould we not be tempted to learn that language? How glad ſhould we be to underſtand the Spaniſh tongue, though it were only to read the Araucana of Don Alonzo D'Ercilia, Don Quixote, ſome dramatic pieces, and a ſmall number of other Spaniſh works, in the original; or the poem of Camoens, in Portugueſe.

VII. The other languages of Europe have each their beauties and excellencies. Among theſe, we muſt not omit to mention the *Gaelic*: A language unnoticed by the learned, and almoſt unknown, or known only to be deſpiſed under a barbarous name*, beyond the mountains where it is ſpoken, till the tranſlation of the beautiful poems of *Oſſian* lately brought it out of obſcurity, and preſented it as an object of ſtudy not unworthy the attention either of the polite ſcholar or the learned philologiſt. See the article OSSIAN; alſo the article GAELIC, in the APPENDIX.

VIII. The greateſt difficulty in all living languages conſtantly conſiſts in the pronunciation, which it is ſcarce poſſible for any one to attain unleſs he be born or educated in the country where it is ſpoken: and this is the only article for which a maſter is neceſſary, as it cannot be learned but by teaching, or by converſation: all the reſt may be acquired by a good grammar and other books. In all languages whatever, the poetic ſtyle is more difficult than the proſaic: in every language we ſhould endeavour to enrich our memories with great ſtore of words, *(copia verborum)*, and to have them ready to produce on all occaſions: in all languages it is difficult to extend our knowledge ſo far as to be able to form a critical judgment of them. All living languages are pronounced rapidly, and without dwelling on the long ſyllables (which the grammarians call *moram)*: almoſt all of them have articles which diſtinguiſh the genders: all the European languages are written from the left to the right, and almoſt all the Aſiatic from the right to the left.

VIII. Thoſe languages that are derived from the Latin have this further advantage, that they adopt without reſtraint, and without offending the ear, Latin and Greek words and expreſſions, and which, by the aid of a new termination, appear to be natives of the language. This privilege is forbid the Germans, who in their beſt tranſlations dare not uſe any foreign word, unleſs it be ſome technical term in caſe of great neceſſity.

---

* Erſe.

PHILOMATHES, a lover of learning or ſcience.

PHILOMELA, in fabulous hiſtory, the daughter of Pandeon king of Athens, was the ſiſter of Progne the wife of Tereus king of Thrace. That prince having raviſhed Philomela, cut out her tongue; and to conceal the knowledge of his inceſt, ſhut her up in a cloſe priſon: but the princeſs finding means to embroider her ſtory, ſent it to her ſiſter Progne; who thus becoming acquainted with her ſiſter's misfortunes, delivered her from priſon, and took her to the palace: then killing Itys, her ſon by Tereus, ſhe ſerved up his fleſh to his father; and after he had done, expoſed the child's head to his view. Tereus, in a tranſport of fury, purſued the ſiſters; but was changed into a lapwing, Progne into a ſwallow, Itys into pheaſant, and Philomela into a nightingale.

PHILONIUM, in pharmacy, a kind of ſomniferous anodyne opiate, taking it name from Philo the inventor.

PHILOSOPHER, a perſon verſed in philoſophy; or one who makes profeſſion of, or applies himſelf to, the ſtudy of nature and morality.

PHILOSOPHER'S *Stone*, the greateſt object of alchemy, is a long-ſought for preparation, which, when found, is to convert all the true mercurial part of metal into pure gold, better than any that is dug out of mines or perfected by the refiner's art; and this only by caſting a little quantity thereof upon metals in fuſion, whilſt that part of the metal which was not mercury is immediately burnt or blown away. But this, like every other ſcientific chimera, will for ever elude the reſearches of mankind.

PHILOSOPHIC, or PHILOSOPHICAL, ſomething belonging to PHILOSOPHY.

PHILOSOPHICAL EGG, among chemiſts, a thin glaſs body or bubble, of the ſhape of an egg, with a long neck or ſtem, uſed in digeſtions.

PHILOSOPHY; the knowlege or ſtudy of nature and morality, founded on reaſon and experience.

The philoſophers among the moſt ancient people of the world were called *ſages* or *wiſe men*, as appears from hiſtory both ſacred and profane. Thales and Pythagoras in Greece were the firſt among thoſe that made an open profeſſion of this ſcience, who thought the title of *ſage* too faſtidious, and took the more modeſt name of *philoſophers*, or *lovers* or *ſtudiers of wiſdom*. Thales, who was a native of Miletus in Ionia, and the firſt of the ſeven ſages, was the founder of the Ionic ſect; his moſt illuſtrious diſciples were Anaximander, Anaximenes, Anaxagoras, and Archelaus. Anaxagoras employed himſelf entirely in the contemplation of the ſtars; and when he was aſked if he had no concern for his country, replied, pointing to heaven with his finger, "I inceſſantly regard my country." Pythagoras founded the ſect that was called *Italic*, becauſe it was ſettled in that part of Italy which was called *Great Greece*, and which now makes part of the kingdom of Naples. He borrowed from the Egyptians a myſterious manner of teaching by numbers; and to that he added a certain harmony, by which he explained the perfection in all objects. He believed the world to be animated, intelligent, and round. Not knowing what to do with the ſoul after its ſeparation from the body, he invented the doctrine of the metempſychoſis. His diſciples of greateſt note were Ocellus of Lucania, Archytas of Tarentum, Philolaus of Croton, Parmenides and Zeno, both of Elea, and Meliſſus of Samos. Zeno was the inventor of the dialectic; the others applied themſelves cloſely to the ſtudy of natural philoſophy, and to the inveſtigation of its principles.

Socrates followed the career of theſe firſt philoſophers, but turned almoſt all his ſtudies towards morality. His maſter was Archelaus the Pythagorean. He was the firſt who began to reduce the confuſed ideas of thoſe who had gone before him into method; for which reaſon he is called by Cicero *the father of philoſophy*. His life was a model of frugality, moderation, and patience; and his doctrine abounds with wiſdom.

Socrates, diſcovering a greater genius in Plato than in any of his other diſciples, had a particular attachment to him, and his labours were not loſt; for, among all the celebrated men who came out of the ſchool of Socrates, Plato was, doubtleſs, the moſt renowned. He taught at Athens, and had in a ſhort time many diſciples. He eſtabliſhed his ſchool in the academy, which was a place without the town, and from thence his followers were called *Academics*. According to Plato, the ſoul of man is only a ray from the Divinity. He believed that this particle, united to its principle, knew all things; but when united to a body, it contracted ignorance and impurity by that union. He did not entirely neglect natural philoſophy, like Socrates, but inquired into many queſtions which relate to that ſcience. He believed that all things conſiſted of two principles, God and matter. He likewiſe cultivated aſtronomy. His morality was the ſame in ſubſtance with that of Socrates.

The diſciples of Plato formed alſo many new ſects. That of which Ariſtotle was the founder is doubtleſs the moſt illuſtrious. This philoſopher was the firſt who formed, from the ſeveral parts of philoſophy, a complete ſyſtem. No one before him had treated ſeparately, and from principles, the different parts of this ſcience. He did not regard logic as a part of philoſophy, but as a proper method whereby to diſpoſe the underſtanding to diſcover the truths that it contains. The morality of Ariſtotle is the moſt perfect of all his works. His phyſics conſiſt of notions and terms that are vague, and as trifling as obſcure. His diſciples and their followers were called the *Peripatetics* of Lyceum, where he had fixed his ſchool.

Ariſtotle was not the only diſciple of Plato who deviated from the ſentiments of that great man: there were others who likewiſe placed themſelves at the heads of different ſects. Arceſilas was the author of a ſect that was called the *Middle Academy*. He declared that there was nothing either certain or true; and that the poſitive and negative might be maintained in all ſorts of ſubjects. Lacydes, who taught in the ſame ſchool as Plato, 56 years after Arceſilas, was the chief of another ſect that was called the *New Academy*. He acknowledged that there was a degree of probability, but that we could not aſſuredly know that any thing was abſolutely true. Pyrrho, about the ſame time, placed himſelf alſo at the head of a ſect. He improved on the dogma of the Academics; and maintained that it was impoſſible to comprehend any thing: but Pyrrho could not comprehend himſelf. He believed that there was nothing true, nothing but what might be ſaid to be either this or that. His followers were called *Pyrrhonians*, or more commonly *ſceptics*, becauſe they ſearched without ever being able to diſcover any one thing.

About the ſame time aroſe two ſects, who, with principles diametrically oppoſite, rendered themſelves highly celebrated, and divided at firſt the wits of Greece, and afterward thoſe of the reſt of the world; and theſe were Zeno and Epicurus. Zeno was of Citium, a city in Cyprus. He taught in the porticoes of Athens, from whence his diſciples were called *Stoics*. The moſt famous dogma of Zeno and the Stoics conſiſted in the principle of morality, which was, to live in conformity to nature, that is to ſay, according to the object of our deſires: on this principle,

ciple, and on divers others, they formed the idea of a philoſophy altogether extravagant, and inſenſible to all external objects. The phyſics of Zeno had nothing new but the terms. The other ſect, which flouriſhed at the ſame time, was that of Epicurus; and they were called *Epicureans*. This philoſopher taught publicly at Athens, his native country, at the age of thirty-two years. He rejected all the chicaneries and ſubtilities of logic, and ſought the truth by means of the ſenſes. He attached himſelf greatly to morality, to which likewiſe tended all his other ſtudies: and his morality was as conſentaneous to the nature of man, as that of Zeno was contradictory; ſeeing that his firſt principle was, that pleaſure is the purſuit of man, and that it conſiſts in health of body and tranquillity of mind; and that it is the ſource and the end of a happy life, &c. Epicurus was alſo engaged, but with leſs ſucceſs, in the labyrinth of metaphyſics, and in phyſics: he adopted the ſyſtem of atoms, of which Democritus was the firſt author. In ſhort, maugre the evil interpretations and calumnies of his adverſaries, he inculcated by his doctrine, and by his example, frugality and ſobriety; and, according to him, death is not an object of terror: "For," ſays he, "it is nothing ſo long as life ſubſiſts; and when it arrives, life is no more; no man has ever felt his death."

It is evident, that theſe ancient ſyſtems of philoſophy are at great variance with each other; and as truth is conſtantly uniform, it follows, that the greateſt part of theſe opinions cannot be true. This conſideration engaged Patomon of Alexandria, under the emperor Auguſtus, to ſelect all that he found moſt rational in the doctrines of all the other philoſophers, whereof he compoſed a ſyſtem, and founded a ſect; and he, for that reaſon, gave to his doctrine the name of the *eclectic philoſophy*, from a Greek word which ſignifies to *ſelect*.

The doctrine of Plato was at firſt in greater eſtimation than any of the others; and there were many celebrated Platoniſts under the Roman emperors down to Julian the apoſtate, who was himſelf one of them. The firſt Chriſtian doctors likewiſe declared for this philoſophy, as Juſtin Martyr, Tatian, Athenagoras, Origen, &c. But at length the philoſophy of Ariſtotle, perhaps of all others the moſt abſurd, took the lead; and truth was no longer ſought for but in the writings of that philoſopher. This violent fondneſs for his reveries began about the 12th century; at which time a philoſophy was formed, that is commonly called the *ſcholaſtic*, and which is borrowed in great part from the writings of the Arabs, whom the ſcholaſtics, who were all attached to Ariſtotle, imitated in their ſubtile, ambiguous, abſtract, and capricious manner of reaſoning, by which they never hit the truth, but conſtantly went on one ſide, or beyond the mark. Toward the end of the 14th century, their ſpirits were extravagantly heated by logical diſtinctions, relative to that furious emulation, which was formed on the doctrine of Ariſtotle, between the Nominaliſts and Realiſts. The former had, for their chief, Ocham, an Engliſh cordelier, and a diſciple of Scotus. They maintained, that the univerſal natures were nothing but words: and the others, who ſupported themſelves by the authority of Scotus, maintained, that the ſame univerſal natures were beings ſtrictly real. Theſe diſputes divided all the univerſities of Europe: philoſophy was no longer employed but in *operations of the intellect*, *conceptions*, *abſtractions*, and ſuch like vain ſubtilties; and became a mere jargon, a confuſed heap of unintelligible ideas.

At length, in the 16th century, philoſophy began to deliver itſelf from the chains of terminology; men accuſtomed themſelves to philoſophize by reaſon, and not by verbal contention: they began to throw off the yoke, and, without entirely deſpiſing Ariſtotle, they no longer believed him on his word. Nicholas Copernicus, who was born at Thorn, in 1473, and died in 1543, had already borne the torch of reaſon in the mathematics and aſtronomy: he had rejected the ſyſtem of the world that was invented by Ptolemy, and which the Greeks called *moſt wiſe and moſt divine*; and had publiſhed his book *De motu octavæ ſphæræ*, and his treatiſe *De revolutionibus*, in which he eſtabliſhed his ſyſtem of the ſun's being immoveable, and of the motion of the earth. Galileo, who was born at Florence in 1564, adopted the ſyſtem of Copernicus, confirmed it, and improved it by new obſervations. This diſcovery of the truth coſt him five or ſix years confinement in the priſon of the inquiſition. He introduced a new and excellent method of reaſoning in philoſophical ſubjects.

Peter Gaſſendus, profeſſor of mathematics in Paris, alſo practiſed, in the beginning of the 17th century, a new method of philoſophizing, which contributed greatly to the progreſs of that ſcience. Laſtly, René Deſcartes appeared almoſt at the ſame time; and, by a method that had been but very imperfectly underſtood before, diſcovered more truths in philoſophy than all the preceding ages had produced; although, from that weakneſs which is natural to the human underſtanding, he has frequently mixed error with truth in his different ſyſtems. He treated on almoſt all the parts of philoſophy, eſpecially the mathematics, phyſics, and metaphyſics. Every one is acquainted with his famous ſyſtem of the *plenum* and *vortices*.

Before Deſcartes, Francis Bacon, baron of Verulam, chancellor of England, had expoſed the errors of the philoſophy of the ſchools, and the wretched method that was there purſued. He was one of the greateſt men that has ever appeared upon the earth. It was he who lighted that torch with which all his ſucceſſors have illuminated philoſophy; and in his writings are to be found the ſeeds of every new diſcovery, and of every new hypotheſis.

After this golden Aurora, the philoſophic horizon was at once enlightened by two grand luminaries, which diſperſed many of thoſe clouds that hid the truth from mortal eyes, and diffuſed great lights, at laſt, on many objects that lay buried in obſcurity. See the articles NEWTON, NEWTONIAN *Philoſophy*, and LOCKE.

From the ſlight draught here given of the hiſtory of philoſophy, we may draw the following conſequences: 1. That philoſophers, in their reſearches concerning the cauſes of all things, have found themſelves obliged to reduce ratiocination into a ſyſtem; to confine it to certain rules, and form it into an art, which they have called LOGIC. 2. That by endeavouring to explain to mankind the nature, the cauſes, and effects of happineſs, the inveſtigation of theſe objects has produced a ſcience that is called MORALITY, to which are connected the doctrines of *natural theology, the law of nature, ethics, politics,* &c. 3. That from their endeavours to inveſtigate the nature of thoſe ſenſible and palpable objects which ſurrounds us, has reſulted a ſcience that is called PHYSICS, or *Natural Philoſophy;* which in like manner conſiſts of ſeveral branches, that all concur to its perfection, ſuch as OPTICS, CHEMISTRY, HYDRAULICS, MECHANICS, and their dependent arts; with many others. 4. That by advancing ſtill further, and by endeavouring to comprehend the nature and properties of ſubjects that are not diſcernible by the ſenſes, but whoſe exiſtence is the reſult of ſpeculation and of a train of reaſoning, a ſcience has ariſen that is called METAPHYSICS; which has alſo many branches, as *ontology, pſychology, coſmology, pneumatology,* &c. 5. That from a deſire to know the extenſion, the figures, the meaſures of all bodies, and their diſtances from each other, &c. they muſt neceſſarily have recourſe to calculation; from whence reſult the *mathematical ſciences,* whoſe principal branches are ARITHMETIC, GEOMETRY, ALGEBRA, ASTRONOMY, &c.

The eſſence of philoſophy in general conſiſts in the inveſtigation of the cauſes of all things; and the grand principle of this inquiry conſiſts in that fundamental maxim, that *no effect is produced without a cauſe;* that *nothing is done without a ſufficient reaſon.* This ſyſtem of the ſufficient reaſon is, therefore, the baſis of all philoſophy, and without it nothing is philoſophical. To conſider the outſide of things, is to know them hiſtorically; to reſolve them, in order to know their principles and their cauſes, is to learn to know them philoſophically; and in this manner even hiſtory may be philoſophically ſtudied. This admirable ſyſtem of the ſufficient reaſon, by diffuſing the ſpirit of philoſophy in the world, has already purged it of numberleſs dangerous ſuperſtitions: the fables of magicians, ſorcerers, ſpectres, ghoſts, the abſolute ſympathy, and a thouſand like reveries, have diſappeared from among men of ſenſe, to the very great advantage of the human race.

Philoſophy may be again divided into *ſpeculative,* which includes the ſubjects of metaphyſics, morality, &c. and *demonſtrative* or *experimental,* which principally regards phyſics; ſeeing that, by the improvement of the human mind by ingenious obſervations and the aſſiſtance of numberleſs admirable inſtruments, modern philoſophers have diſcovered the means of explaining the principal phenomena of nature by experiments, and of demonſtrating their hypotheſes to the ſight and to the touch, which afford proofs much more evident than thoſe of our anceſtors, which were drawn merely from logical inferences.

Natural PHILOSOPHY. See PHYSICS.

Experimental PHILOSOPHY. See EXPERIMENTAL *Philoſophy.*

Moral PHILOSOPHY. See MORALS.

PHILOSTORGIUS, an eccleſiaſtical hiſtorian of the 4th century, was born in Cappadocia, and wrote an abridgment of eccleſiaſtical hiſtory, in which he treats Athanaſius with ſome ſeverity. This work contains many curious and intereſting particulars. The beſt edition is that of Henry de Valois in Greek and Latin. There is alſo attributed to him a book againſt Porphyry.

PHILTER, or PHILTRE, (*Philtrum,*) in pharmacy, &c. a ſtrainer.

PHILTER, is alſo uſed for a drug or preparation, which, it is pretended, will excite love.—The word is formed from the Greek φιλεω, "I love," or φιλος, "lover."

Philters are diſtinguiſhed into *true* and *ſpurious.* The ſpurious are ſpells or charms, ſuppoſed to have an effect beyond the ordinary laws of nature by ſome magic virtue; ſuch are thoſe ſaid to be given by old women, witches, &c.—The true philters are thoſe ſuppoſed to work their effect by ſome natural and magnetical power. There are many grave authors, who believe the reality of theſe philters; and allege matter of fact in confirmation of their ſentiments: among the reſt, Van Helmont, who ſays, that upon holding a certain herb in his hand for ſome time, and taking afterwards a little dog by the foot with the ſame hand, the dog followed him wherever he went, and quite deſerted his former maſter; which he pretends to account for thus. The heat communicated to the herb, not coming alone, but animated by the emanations of the natural ſpirits, determines the herb towards the man, and identifies it to him: having then received this ferment, it attracts the ſpirit of the other object magnetically, and gives it an amorous motion.—But this is mere cant; and all philters, whatever facts may be alleged, are mere chimeras.

PHILYCA, in botany. See PHYLICA.

PHIMOSIS, in medicine, a diſorder of the penis, in which the prepuce is ſo ſtrict or tenſe, that it cannot be drawn back over the glans. See SURGERY.

PHLEBOTOMY, the opening of a vein with a proper ſharp-edged and pointed inſtrument, in order to let out a certain quantity of blood either for the preſervation or recovery of a perſon's health. See SURGERY.

PHLEGM, in the animal œconomy, one of the four humours whereof the ancients ſuppoſed the blood to be compoſed. The chemiſts make phlegm or water an elementary body, the characters of which are fluidity, inſipidity, and volatility.

PHLEGMAGOGUES, in medicine, a term anciently made uſe of for ſuch medicines as were ſuppoſed to be endowed with the property of purging off phlegm; ſuch as hermodactyls, agaric, turbith, jalap, &c.

PHLEGMATIC, among phyſicians, an appellation given to that habit or temperament of body wherein phlegm is predominant; which gives riſe to catarrhs, coughs, &c.

PHLEGMON, denotes an external inflammation and tumour, attended with a burning heat.

PHLEGON, ſurnamed TRALLIANUS, wrote ſeveral books, very few of which are now extant. He was the emperor Adrian's freed-man. The hiſtory of Adrian publiſhed under Phlegon's name, is thought to have been written by Adrian himſelf. It is ſaid that Phlegon ſpoke of the darkneſs which prevailed during our Lord's paſſion; which has cauſed ſeveral diſputes both among ancients and moderns.

PHLOGISTON, a term uſed by chemiſts to expreſs that inviſible and very much unknown ſubſtance, which, in conjunction with heat or elementary fire, pro-

Phlogiſton.

produces the phenomena of flame or ignition, and gives to metals their ſplendor; which, in other circumſtances, contaminates the white colour of ſome earths and metallic calces, with black, brown, or other ſhades; and which in ſome caſes renders the air noxious, and incapable of ſuſtaining the life of animals, or ſupporting flame, &c. &c.

1
Phlogiſton cannot be procured in an uncombined ſtate.

To give a definition of this *principle of inflammability*, as the phlogiſton is frequently called, has hitherto been found impoſſible; becauſe, it is ſo far from being the ſubject of inveſtigation by itſelf, that no perſon has yet been able to procure it by itſelf; neither is it poſſible to expel it from any one body, without ſuffering it, in the very ſame moment, to combine with another. In the act of burning, for inſtance, phlogiſton is diſcharged very copiouſly by any inflammable body; but ſome part, and that a very conſiderable one, goes to the compoſition of the flame. Part of the remainder is carried off by the air, and goes to the formation of ſoot; another part contaminates the air, and either converts part of the atmoſpherical air into what is called *fixable air*, or, according to others, *phlogiſticates* it, while the fixable air is ſeparated from the atmoſphere itſelf, of which it is originally a component part: but in all this proceſs, no part of the phlogiſton is to be diſcovered by itſelf. In like manner, when iron is diſſolved in the vitriolic acid, a great quantity of phlogiſton is diſcharged: but in this caſe alſo it is altogether inviſible, and incapable of being ſubjected to examination; the only reſult of this proceſs being a kind of aërial vapour, by Dr Prieſtley and others called *inflammable air*: and ſo, in all other phlogiſtic proceſſes, though we are aſſured that the principle is diſcharged in great quantity, yet it conſtantly eludes our moſt diligent ſearch.

2
Arguments for the identity of elementary fire and phlogiſt.n.

From this inviſibility of the phlogiſton, it has been concluded, either that phlogiſton is the matter of fire, heat, and light, or that theſe elements contain it in great quantity. The arguments for this opinion ſeem reducible to the following. 1. Phlogiſton is in ſome caſes capable of penetrating the ſubſtance of the cloſeſt bodies, in ſuch a manner as to be capable of reducing calcined metals to their proper ſtate. 2. The light of the ſun appears to contain phlogiſton; as it will turn the calx of ſilver black when expoſed to it, even tho' the calx is included within a glaſs veſſel ſtopped in the moſt careful manner. In like manner, the green colour which the leaves of plants acquire from the ſolar light is thought to be owing to a communication of phlogiſton from it. 3. Dr Prieſtley has determined, that the electric fluid either is the phlogiſton itſelf, or contains it; becauſe an electric ſhock will either reduce metals to a calx, or reſtore them from a calcined to a metallic ſtate.

3
Inſufficient.

In conſidering theſe arguments, however, it is obvious, that it ought firſt to be proved beyond diſpute, that the ſubſtance of fire, light, or electric fluid, can be fixed in bodies in ſuch a manner as to gravitate, and ſenſibly increaſe the weight of ſuch bodies. That phlogiſton can do this, ſeems to be demonſtrable from a known fact in the converſion of iron into ſteel; for in this caſe, the ſteel produced always exceeds in weight the iron originally employed. But in no caſe whatever can we combine the matter of fire or light directly with any ſubſtance in ſuch a manner, that we can ſay beyond a doubt, that we have made the flame or the light ponderable. The celebrated Mr Boyle made a vaſt number of experiments upon this ſubject, and ſuppoſed that he had ſucceeded, becauſe many bodies, ſuch as lead, become heavier from being expoſed to the action of fire. But later experiments have diſcovered, that this increaſe of weight is owing to an adheſion of air, and not of fire or light, as was commonly thought. Neither can it be at all proved, that the fire or light is in theſe caſes converted into air, as ſome have imagined. Beſides, in the only caſe in which any thing like pure phlogiſton is ever ſeparated by itſelf, at leaſt as far as we yet know, it is ſo far from appearing like what we would expect from light or heat, that it is the very reverſe; and if there was ſuch a principle in nature as *poſitive darkneſs*, the phlogiſton would ſeem to have a much greater affinity to it than to light. The very remarkable experiment to which we now allude is recorded by Dr Prieſtley † (its author) in the following words.

Phlogiſt

4
No auth
tic inſtan
of fire be
ponderab

"A very ſingular decompoſition of inflammable air I obſerved in conſequence of expoſing a great variety of ſubſtances to the influence of a ſand-heat, which I kept up for ſeveral months. Among other things I buried in this hot ſand, glaſs tubes hermetically ſealed, and previouſly filled with all the different kinds of air. I filled them in the following manner.

5
Inflamm
ble air de
compoſe
by heat.

"Having provided myſelf with glaſs tubes about four feet long, and about one third or one half of an inch in diameter, and of ſuch a thickneſs that I could eaſily melt them with the flame of a couple of candles and a common blow-pipe, I firſt ſealed the tubes at one end, then filled them with quickſilver, and placed them inverted in a baſon of the ſame. After this, either transferring the air in a bladder from the jars in which they had been ſtanding in water, or generating the air afreſh, if it was of a kind not to bear the contact of water, I filled the tubes completely with the kinds of air on which I wiſhed to make the experiment, diſplacing the quickſilver. This being done, I inclined the tube, and applying the flame of my candles, with ſome care, (holding the blow-pipe in my mouth only, and keeping firm hold of the tube on each ſide of the place to which I was applying the heat,) I melted the glaſs, and took off what lengths of it I pleaſed; and every piece was of courſe hermetically ſealed. Theſe pieces I marked with a file, keeping an account of the meaning of the marks, that when I took them out of the ſand I might preſently know with what kind of air they had been filled.

"When I was performing this part of the proceſs with inflammable air in flint-glaſs tubes, I obſerved that the places to which I applied the heat were generally tinged black: but I gave little attention to this circumſtance, thinking it might be ſomething accidental; and, without any particular expectation, I buried theſe tubes in the ſand together with the others. This was on the 25th of September 1777.

"On the 20th of January following, I examined theſe tubes, together with every thing elſe that had been expoſed to the ſame heat. The tube containing the inflammable air was 10 inches long, and by ſome accident was broke; but it was jet black throughout. At this I was very much ſurpriſed, but I did not then ſuſpect that it was at all owing to the inflammable air with which it had been filled; thinking it might have been occaſioned by ſome phlogiſtic matter in the ſand, or in ſome of the veſſels that had been burſt in the neighbourhood. Reflecting, however, on this odd circumſtance, and thinking, from the uniformity of the tinge, that poſſibly it might have been occaſioned by the inflammable air, I filled another ſmall glaſs tube with the ſame air; and, ſealing it hermetically, buried it deep in ſand contained in an iron pot, which I ſet on the fire, and made very hot, nearly red; and taking it out the next day, I found the tube quite black, except a ſmall part on one ſide of that end which had been uppermoſt, about two inches higher than the other, and conſequently had not been expoſed to ſo great a degree of heat.

---

† *Experiments in Natural Philoſoph* vol. i. p. 369.

" Being now fully ſatisfied that the blackneſs of the tube was certainly occaſioned by the inflammable air within it, in circumſtances in which it could not expand, I proceeded to examine the ſtate of the air. But, in the firſt place, to aſſure myſelf that there had been no communication between that air and the external air by means of ſome unperceived crack in the glaſs, I plunged it in water, and, exhauſting the air over it, I did not perceive that any bubble eſcaped. Then, breaking the end of the tube under water, I examined it, and found it not to be inflammable. Sometimes, however, when I have only made the tube juſt black throughout, by applying the flame of a candle with a blow-pipe to every part of it in ſucceſſion, the air has ſtill been inflammable.

" Putting two glaſs tubes, about four inches in length, and a quarter of an inch in diameter, into a ſand furnace, I kept them in it two days; when I took them out, and obſerved, that the tube which I had placed at the bottom of the ſand in the greateſt degree of heat was nearly melted, and perfectly blue like indigo; while the other tube, which had not been expoſed to ſo great a degree of heat, was of a beautiful jet black throughout.

" Examining the air in theſe tubes, I found that in the black tube reduced to one third of its bulk, and mere phlogiſticated air. It did not make lime-water turbid, was not affected by nitrous air, and was not inflammable. The air in the blue tube, or that which had been expoſed to the greateſt degree of heat, was reduced to a very ſmall bubble, ſo that no experiment could be made upon it. I have no doubt, however, that it was phlogiſticated.

" At one time I had a ſuſpicion that this blackneſs communicated to the glaſs was ſomething precipitated from the iron by the ſolution of which the inflammable air had been made; but I was ſoon convinced of the contrary, by finding that the effect was the very ſame when the inflammable air was made from zinc.

" I ſoon found that there was no occaſion for ſuch a long proceſs to produce this effect, at leaſt upon the glaſs. For it began to be diſcoloured the moment it was red-hot, or rather when it became ſoft; as was evident by holding one of the tubes in an open fire, or in the flame of a candle; for wherever the heat was applied, the blackneſs took place immediately, without affecting any other part of the tube.

" When I examined this black tinge narrowly, I found that it did not penetrate the glaſs; but formed a delicate ſuperficial tinge, leaving the glaſs as perfectly poliſhed as before the proceſs. But the blackneſs was indelible: at leaſt it could not be ſcraped off without tearing the ſurface of the glaſs, and it made no change in it with reſpect to electricity; for the tube thus blackened was as perfect a non-conductor as ever.

" The blue colour of the glaſs that was moſt heated, Mr Delaval informed me, was owing to ſomething of iron in the compoſition of the glaſs. That it alſo depended on the degree of heat, I aſcertained by placing one of theſe tubes in a vertical poſition in the ſand-heat. For the lower end of the tube, which had been moſt heated, acquired a deep blue colour, and it paſſed into black at the upper end of the tube without any intermediate colour. There was alſo no other colour higher than the black; ſo that the firſt tinge which the glaſs receives is a perfect black. Yet, viewing the firſt tinge that it receives by the light of a candle placed beyond it, it ſeemed to have a ſhade of red.

" As I was ſenſible that the blackneſs was owing to the precipitation of phlogiſton from the inflammable air, I thought it poſſible that ſome ſubſtance which had a near affinity with phlogiſton might diſcharge it; and trying minium, it ſucceeded immediately. Having filled one of theſe black tubes with this metallic calx, the moment I made it red hot, the blackneſs entirely diſappeared, and left the tube as tranſparent as ever it had been.

" In the firſt experiment of this kind I uſed minium out of which all its air had been expelled by heat, and which is of a yellow colour. In this proceſs it became whiter, and adhered a little to the glaſs. When I ſcraped it off, I could not be quite ſure that any part of it had become real lead, but it evidently approached towards a metallic ſtate, by being of a more compact texture than before.

" In this ſtate of the experiments it was ſuggeſted by Mr Bewly, that probably the lead in the glaſs tubes had attracted the phlogiſton; and I preſently found this to be the caſe. For when I had filled a green-glaſs tube with the inflammable air, and ſealed it hermetically, as I had done the flint-glaſs tubes, I expoſed it to a melting heat, which is greater than that which flint-glaſs will bear, without producing any change of colour in it. What remained of air in the tube that did not eſcape when part of it was melted, was ſtill ſtrongly inflammable.

" It appears, therefore, from this experiment, that the calx of lead, in the form of glaſs, has a ſtronger affinity with phlogiſton than any thing in the compoſition of inflammable air, in a degree of heat capable of melting glaſs. Or, if there be no proper conſtituent part of inflammable air beſides phlogiſton, the attraction of the calx is ſo great as to reduce the phlogiſton from an elaſtic and uncombined ſtate to a fixed and combined one.

" Having by means of theſe glaſs tubes effected a complete decompoſition of inflammable air, the phlogiſton in it having united with the glaſs of the lead; I thought, that if there had been any acid in its compoſition, it would then be diſengaged, and be found in the tube. In order to find whether there was any acid in it or not, I poured into one of theſe tubes a ſmall quantity of water made blue with the juice of turnſole; but it came out as blue as it went in."

Phlogiſton.

6 Phlogiſton tends to make bodies opake.

From this curious experiment it appears, that phlogiſton tends to make bodies opaque even when tranſparent before; and indeed ſomething of this kind is always obſerved in whatever manner we apply phlogiſton. The calces of lead or tin, made by diſſolution and precipitation with the vitriolic acid, though of the pureſt white, become immediately tinged with black by an union with the ſmalleſt particle of phlogiſton; or at leaſt their whiteneſs is ſo much ſullied, that the tendency of phlogiſton to produce a black colour is viſible on all occaſions. Metals alſo, when combined with phlogiſton, are exceedingly opaque; but, when deprived of it, and expoſed to a very ſtrong fire, they melt into a tranſparent glaſs. Now, if phlogiſton was the ſame thing with fire or light itſelf, we ſhould be apt to ſuppoſe that ſuch bodies as had been longeſt expoſed to the action of fire would contain moſt of it; but this is not found to be the caſe. Neither can it well be anſwered, that fire in an active ſtate is capable of expelling fire in a quieſcent ſtate; becauſe it muſt be with this element as with water: ſucceeding quantities of water, if they are violently urged on, will expel the quantity which lies before them; but at laſt, a certain quantity will remain in the ſubſtance through which the water paſſed; and this quantity will be the ſame whether the ſubſtance has been immerſed in a ſwift or ſlow running ſtream. In like manner, when a ſubſtance is expoſed to the action even of the moſt violent fire, that element can only paſs through it, as we might ſuppoſe water to paſs through a ſieve, while it remains in the fire; but when it is taken out, and ſuffered to cool, a certain quantity of the fire muſt neceſſarily be ſuppoſed to become quieſcent, becauſe it has nothing to expel it. It would ſeem probable, therefore, that if phlogiſton was of the ſame nature with fire, no other change could be made upon bodies by expoſing them to the action of that element, than melting, or altering their form; but we evidently ſee that the fire carries off one part of their ſubſtance, and leaves another.

7 Fire cannot be ſuppoſed capable of expelling itſelf.

8 Electric fluid cannot be proved to be phlogiſton.

Again, with regard to the calcination of metals by the electric fluid, it does not appear to act differently from common fire. An electric ſpark made to paſs between two ends of wires, will deprive them of ſome part of their phlogiſton: but this cannot prove that the electric fluid is the phlogiſton of which they are deprived, becauſe in this caſe they would contain leſs electric matter than before; but of this we can have no certainty, becauſe all bodies ſeem to be full of this fluid, and we have no method of meaſuring the quantity contained in different bodies. As to the reduction of metallic calces by the electric ſpark, the fact is denied by ſome eminent foreign philoſophers; but although it ſhould be granted, yet we muſt obſerve, that a ſpark of electricity cannot be procured but by making the fluid paſs through a ſmall ſpace of air interpoſed between two ends of wires, or ſome ſimilar ſubſtances. Now though in this caſe the ſpark ſhould reduce a metallic calx lying between theſe two wires, yet this could never prove that the electric fluid itſelf was phlogiſton; becauſe, in paſſing from one wire and entering the other, a quantity of phlogiſton muſt neceſſarily be extricated from the wires by the violent impulſe of the fluid. We muſt ſuſpect, therefore, that the electric matter in this caſe only gives to the calx the phlogiſton which it takes from the wires: or, is it not poſſible that the phlogiſtic matter may in part be derived from the air, which always contains a quantity of it?

Phlogiſ

It hath been obſerved, that by making the electric ſpark paſs a great number of times through a ſmall quantity of air, the latter becomes diminiſhed and phlogiſticated. But in this caſe alſo the phlogiſton is evidently derived from the metallic points between which the ſpark muſt paſs. The argument therefore drawn by Dr Prieſtley from this fact, for the phlogiſtic nature of the electric fluid, cannot hold. It is the ſame thing as calcining metals confined in a certain quantity of air by a common fire; for in this caſe the air is always found to be phlogiſticated.

9 Inſufficien- cy of argu ments drawn fr the black- ening of calces of ver by the ſun-beams

The arguments drawn from the blackening of the calces of ſilver by the ſolar beams, ſeem alſo to be inconcluſive. Glaſs, as appears from Dr Prieſtley's experiment above related, will imbibe phlogiſton, and will alſo part with it, without loſing its texture as glaſs. Poſſibly the caſe may be the ſame with the calx of ſilver juſt now mentioned. The glaſs, though it appear to us quite clear and tranſparent, may contain ſome phlogiſtic matter, which by the action of the ſolar light may be transferred to the calx; or it may come from the air contained in the glaſs. At any rate, it is impoſſible, from a ſingle experiment, to deduce ſuch an important conſequence, eſpecially as it is attended with a ſingularity which at once overthrows almoſt every inference we can draw from it. If we ſuppoſe the light of the ſun to be phlogiſton, much more ought we to ſuppoſe the light of a common fire to be the ſame: and if this were the caſe, then the lunar calx ought to be blackened by expoſing it to the light of a common fire as well as to the rays of the ſun. But this is found not to be the caſe; for though we expoſe the calx of ſilver to a common fire ever ſo long, no blackneſs will take place. It is the ſame thing with regard to the green colour of plants; for this is produced by the ſolar light, and by that light only: ſo that we muſt own it to be in ſome reſpects ſpecifically different from the light of our common fires; but as theſe differences are totally unknown to us, it is plain, that, until our knowledge in this reſpect is increaſed, we cannot argue concluſively concerning the nature either of the one or the other.

10 And of thoſe fr the gree colour of plants.

11 Air not made el by phlog ſton.

In Dr Prieſtley's treatiſe on air, he ſuppoſes that it is the phlogiſton which gives elaſticity to that fluid. But in this alſo that eminent philoſopher ſeems to have been miſtaken. It is certain that elaſticity is not neceſſarily connected with phlogiſton, ſince it may be entirely deprived of its elaſticity, and fixed in the ſubſtance of ſolid bodies; of which Dr Prieſtley himſelf gives a moſt remarkable inſtance in the experiment above related of the inflammable air contained in the glaſs tube. It is impoſſible that the phlogiſton, while in a quieſcent inactive ſtate, can either be in a ſtate of expanſion, or have a tendency to expand; becauſe this would be ſuppoſing it to have two natures diametrically oppoſite to each other at the ſame moment. If therefore this ſubſtance has ſome qualities peculiar to its ſtate of quieſcence, and others peculiar to its ſtate of expanſion, we muſt of neceſſity ſuppoſe that there is ſome third ſubſtance, by means of which its properties are changed at different times. Now we know, that this third ſubſtance is the fire; or rather the fire and

12 Phlogiſton receives its elaſticity from fire.

and air combined, for fire alone will not expel phlogiſton. If then the fire originally gives its elaſticity to phlogiſton, it is in the higheſt degree probable, that to this element it owes its permanent elaſticity alſo.

13 Heat not occaſioned by an evolution of phlogiſton.

Some authors have been of opinion, that heat is produced by what they call the *evolution of phlogiſton*; and Dr Dugud Leſlie, in his treatiſe on animal-heat, labours throughout a whole chapter to prove, that the evolution of phlogiſton is attended with heat. But granting that it is ſo, if we ſuppoſe this evolution to be the *cauſe* of heat, we are certainly wrong; for the cauſe of heat would then be whatever evolves the phlogiſton. Dr Leſlie ſuppoſes that the action of the blood-veſſels evolves the phlogiſton; and in this caſe the action of the veſſels, not the evolution of phlogiſton, is the cauſe of heat. But in many caſes the argument will not hold: for there are numberleſs inſtances where phlogiſton is evolved in great quantity, without any conſiderable degree of heat being produced; and in thoſe where the greateſt heat is produced, the phlogiſton ſeems not ſo properly to be *evolved*, as to be *deſtroyed* in ſuch a manner that it can never afterwards be found.

14 Fire not a combination of phlogiſton with air.

Some philoſophers, and among the reſt Mr Schele, have ſuppoſed, that fire conſiſts in a chemical combination of phlogiſton with dephlogiſticated air; in which caſe, ſays he, the compound becomes ſo fine and ſubtle, that it paſſes through the pores of the moſt ſolid bodies, glaſs itſelf not excepted. But this ſuppoſition is entirely contrary to the analogy of nature. It is certain, that both the air and phlogiſton, ſeparately, are incapable of paſſing through glaſs; excepting in certain circumſtances, where hot glaſs is found to be penetrable by phlogiſtic vapours: nor have we any inſtance of a mixture of two thick liquids producing a thin one. It ſeems indeed impoſſible that this could be the caſe without a change of nature in both fluids; and no ſubſtance can change its nature of itſelf. Certain ſubſtances indeed there are, which appear to change their natures by being mixed; but if we conſider the matter fairly, we will find that this change is only in appearance. Thus, if powdered cream of tartar is mixed with chalk or quicklime, the mixture appears to deliquiate in the air, which is a property belonging neither to the chalk nor cream of tartar. But here a quantity of alkaline ſalt is produced, which naturally deliqueſces, and occaſions the deception. In like manner, when a neutral ſalt is formed by an acid and alkali, both of which taken ſeparately will deliquiate in the air, yet the nature of theſe component parts are not changed though the neutral ſalt does not deliquiate: only their attraction for each other is ſo ſtrong, that their attraction for water becomes leſs than that of the air for the ſame element; and of conſequence the ſalt remains dry. But at any rate, there is no poſſibility of making a ſaline ſolution more fluid than water. Every ſubſtance which can be diſſolved in water or an aqueous fluid, always takes ſomething from its fluidity; and the ſame thing happens with oil, or any other fluid thicker than water. It is incredible that two kinds of oil, both of them having a thick conſiſtence when ſeparate, ſhould yet, by ſimple mixture, become as fluid as water: yet on a ſimilar ſuppoſition, which cannot be explained by any known fact in nature, proceeds the whole of Mr Schele's hypotheſis.

15 Phlogiſton can penetrate hot glaſs, and why.

It may indeed be argued, that phlogiſton is by itſelf capable, in ſome caſes, of pervading ſolid bodies; and conſequently may communicate to the common atmoſphere, by a chemical combination with it, ſuch a degree of fluidity, that it will paſs through the pores of glaſs or any other ſolid ſubſtance. In ſupport of this hypotheſis it may be urged, that Dr Lewis * aſſerts his having ſeen globules of lead revived by the action of the phlogiſtic vapours of charcoal, even in the middle of thick pieces of glaſs, where there was not the leaſt appearance of a crack. It is certain alſo, that though we deprive mercury of its phlogiſton as much as poſſible by means of the nitrous acid, it will riſe in its native form by diſtillation in the cloſeſt veſſels.

But in theſe, and other ſimilar inſtances, we are to conſider, in the firſt place, that by heat the pores of all bodies are opened, and conſequently made liable to receive ſubſtances, which in their natural ſtate they would not receive. All fluid ſubſtances alſo have their fluidity increaſed by heat. Thus, we will find that warm water will paſs through a thick cloth in a much more full and copious ſtream than an equal quantity of cold water will do. Now, when glaſs is much heated, its properties are remarkably changed. It loſes its tranſparency, and becomes a conductor of electricity; and if it then conducts this fluid, or modification of a fluid, which at other times it cannot do without being ſhattered to pieces, this evidently ſhows that it may alſo conduct, or be penetrable by, vapours of various kinds. This will account in a ſatisfactory manner for the revival of lead in the heart of ſolid pieces of glaſs; for it is not pretended that a revivification of this kind will take place in the cold, even tho' the glaſs ſhould be expoſed to the greateſt quantity of phlogiſtic vapours that can be imagined. Hence the inference muſt be very ſtrong, not that heat derives any of its activity from phlogiſton, but that all the activity which phlogiſton poſſeſſes is derived from heat.

16 Why the calces of mercury may be revived without addition.

Again, with reſpect to the calcination of mercury, and its revival by mere heat, it muſt be remembered, that neither calcinations nor revivifications of metals can take place *in vacuo*. Mercury may indeed be reduced to a kind of calx by expoſure to the fire, but then it muſt alſo be expoſed to the air at the ſame time; and indeed the caſe is the ſame with all metals. It is probable, therefore, that all of them receive ſomething from the air, and this is abundantly confirmed by experiments; for no calx can be reduced without an emiſſion of air at the time of reduction. The common metals on this occaſion emit fixable air; but the calces of mercury emit dephlogiſticated air. If the air is dephlogiſticated, it is plain that the calx muſt be phlogiſticated; becauſe the air of our atmoſphere is not in a pure dephlogiſticated ſtate. The phlogiſton it contains muſt therefore be diſpoſed of in ſome way or other, and it is in the higheſt degree probable that it remains with the calx. But a phlogiſticated calx becomes a metal, when expoſed to a proper heat. In the revival of mercury, therefore, the phlogiſton probably comes from the air. Silver and gold, which are indeſtructible by fire, probably owe this quality to their having little attraction for fixed air, but a great deal for phlogiſton. The conſequence

---

* *Neumann's Chemiſtry*, i. 80. note (i.)

of this muſt be, that if a calx of ſilver or gold is expoſed to the air and to the action of heat at the ſame time, the calx will imbibe the phlogiſton rather than fixable air; and of conſequence will always appear in a metallic ſtate, though it ſhould be calcined ever ſo long.

17 Enumeration of the properties of phlogiſton.

Having thus ſhewn at ſome length, that phlogiſton cannot with any probability be ſuppoſed to have active qualities of its own diſtinct from thoſe which it receives from the fire, we muſt next inquire into its nature from the few properties which it is certainly known to poſſeſs. Theſe properties may be reduced to the following.

1. It is capable of being reduced to an exceedingly thin, permanently elaſtic, and light vapour; in which ſtate it has all the properties of a ſpecies of air.

2. It may be deprived of this elaſticity, and combined with terreſtrial bodies; in which caſe it becomes ponderable, and gives a remarkable degree of opacity to all bodies with which it unites itſelf.

3. In a great many caſes it is a means of producing and preſerving flame; eſpecially when combined with terreſtrial bodies.

4. In ſome caſes it appears to give a violent exploſive power to common air.

5. When combined with air in a certain degree, it deprives it of the very eſſential properties of ſupporting flame or animal-life.

From a general conſideration of theſe properties, it appears probable that phlogiſton is a terreſtrial ſubſtance, expanſible indeed in the higheſt degree, but which may alſo be reduced to a ſolid, and which in that ſtate of ſolidity ſeems to be endowed with no other properties than thoſe of paſſive terreſtrial matter, owing all its activity to a combination either with fire or air.

In conſidering the phlogiſton with regard to its property of ſuſtaining flame, we find that the greater quantity of the inflammable principle there is in any ſubſtance to be inflamed, the more eaſily and fiercely it burns; and the ſame effect follows, if the air is perfectly free from phlogiſton, though the inflammable ſubject ſhould contain a ſmaller quantity of it. But if we invert this proportion, loading the air with phlogiſton, and at the ſame time giving a great quantity of it to the fuel, the fire will infallibly be extinguiſhed, though made ever ſo fierce originally.—Now to underſtand the reaſon of this, we muſt call to mind what hath already been delivered in various parts of this work, concerning the nature of electric fluid, heat, vapour, fire, and flame. Under theſe articles it has been ſhown,

18 Recapitulation of the properties of heat.

1. That fire, heat, light, and electricity, are only ſo many different modifications of the ſame fluid, which we ſhall here call the *etherial fluid*.

2. That the etherial fluid acting as fire or heat, acts from a centre to the circumference, in every part of the heated body.

3. That the ſame fluid acting as light, vibrates as from a centre, but that the centre from which it vibrates is at a diſtance from the body on which the light falls.

4. When a great quantity of light falls upon any body, that is, when the vibrations of the etherial fluid towards it are exceedingly vehement, they penetrate its ſubſtance, however ſolid it may be, and a new vibration takes place within the ſubſtance of the body itſelf. The centre from which the vibrations proceed being then within the body, heat is the certain conſequence; and therefore every intenſe light will in a ſhort time produce heat.

5. In certain bodies the etherial fluid may have a vibration, or tendency to vibration, within the ſubſtance of the bodies themſelves, though by reaſon of their texture this vibration is not obſerved externally. In this caſe the heat is ſaid to be *latent*, and the body is cold to the touch, as is the caſe of vapour.

6. When this tendency to expand becomes exceedingly great, the particles by which the etherial fluid is confined muſt yield to its impulſe, and the body becomes hot to the touch; or if the impulſe is very violent, it breaks out into flame, and burns fiercely.

7. Flame cannot exiſt without a decompoſition of vapour; and this decompoſition takes place as ſoon as more latent heat is forced upon the vapour than it can contain.

8. Vapour will abſorb heat to a certain degree; and in proportion to this abſorption, it cools thoſe bodies which it touches, or extinguiſhes fire when blown upon it.

9. Vapour, having abſorbed as much heat as it can contain, when blown upon a fire, inſtead of extinguiſhing it, is inſtantly decompoſed, and is converted into violent flame, returning back all the heat which it had formerly abſorbed.

Under the article FLAME, it has alſo been ſhown, that probably no vapours whatever are abſolutely uninflammable, though ſome are ſet on fire with much more difficulty than others. Thoſe which are eaſily inflamed we call *inflammable*, and thoſe which cannot be inflamed without a great deal of diffculty are called *uninflammable*. As, therefore, among all this variety of vapours there muſt be one more inflammable than all the reſt, it is very natural, if it is frequently to be met with, to call it the *phlogiſton*, or inflammable principle. Now, we find a certain kind of ſubſtance ſo univerſally diffuſed throughout nature, that ſcarce any any thing ſeems to be perfectly diveſted of it. This ſubſtance is oil, and it is univerſally allowed to contain a great quantity of the phlogiſtion. But, when we come to analyſe the ſubſtance of oil itſelf, we find it compoſed of an earthy matter which remains in the retort after diſtillation; and of a fluid, thinner than the oil originally was, which ariſes in vapour: but if this thin oil be ſubjected to a ſecond diſtillation, it again leaves a quantity of fixed matter, and yields a portion of oil ſtill more fluid than before. By a repetition of the proceſs, more earth is ſtill produced, the oil which ariſes becomes leſs and leſs in quantity, till at laſt it cannot by any means be collected.—Hence it is probable, that oil is compoſed of earthy particles diſpoſed in ſuch a manner that they are eaſily fitted for abſorbing heat, and thus being converted into vapour; at the ſame time that they are alſo very eaſily capable of being decompoſed, and of parting with the heat, after which they reſume their original terreſtrial form.

19 Analyſis of oil.

20 Phlogiſton only a portion of empyreumatic oil.

From a conſideration of all this, we are naturally led to conclude, that the *phlogiſton*, properly ſo called, is only a portion of empyreumatic oil, that is, of oil which

21 Solution of the phenomena of phlogiſton on this principle.

which is partly decompoſed by having been expoſed to a violent heat.—This hypotheſis will ſolve all the phenomena in which phlogiſton is concerned.—Alkalies and calcined earths are found to attract phlogiſton powerfully, and ſo likewiſe they do the groſſer oils.—The vitriolic acid unites with phlogiſton, and ſo will it do with oils of almoſt every kind.—The nitrous acid unites more powerfully with phlogiſton than moſt other ſubſtances; but the ſame acid will unite with many kinds of oils ſo violently, as to ſet them on fire.—Phlogiſton ſtains every thing black which it touches, and ſo does empyreumatic oil.—Phlogiſton, when combined with air, will extinguiſh flame; but oil will do ſo likewiſe, if it is thrown on a fire in too great quantity. The reaſon is the ſame in both caſes. Oil abſorbs fire in great quantity before it can be raiſed in vapour; and until it can be raiſed in vapour, it cannot be kindled. After it is reduced to vapour, it ſtill abſorbs more before the vapour is converted into flame. If then the phlogiſton is poured upon flame while it is in this abſorbing ſtate, the undoubted conſequence muſt be, that, inſtead of adding any thing to its heat, it will take ſomething from it, and if the quantity is ſufficiently large, the flame muſt be extinguiſhed. In like manner, when oil in its liquid ſtate is poured upon fire, it abſorbs part of the heat; and if the quantity of oil poured on is capable of abſorbing more heat than the fire can give, an extinction of the flame will undoubtedly take place. But if phlogiſton is poured upon flame, after having abſorbed as much fire as it can contain, it will then, inſtead of extinguiſhing, increaſe the fire to a great degree; becauſe the texture of it is entirely decompoſed, and it throws out at once all the fire it had imbibed before. In like manner oil, if heated till juſt ready to inflame, will burn fiercely if thrown into a fire though in ever ſo large a quantity. Nay, if oil is violently heated in a veſſel over the fire, and that veſſel afterwards ſet down upon the cold and moiſt ground, the oil will be ſet on fire. The reaſon of this is, that the ſuperabundant heat contained in the veſſel and lower parts of the oil, is, by the cold, violently forced towards the ſurface, whence a thick vapour is continually ariſing. This vapour has already as much latent heat as it can contain; but more being continually forced upon it, in attempting to fly from the cold below, the vapour is entirely decompoſed, and throws out not only that quantity which the cold forces upon it, but all that the oil had imbibed while it continued over the fire.

22 Generation, &c. of inflammable air accounted for.

Hence we may account for the generation and phenomena of inflamable air. This is produced in the firſt place by acids, in the ſecond place by the diſtillation of inflammable ſubſtances by a ſtrong fire, and in the third place by the vapour of vitriolic ether.

1. When the vitriolic acid is poured upon filings of iron, a vapour ariſes, which is not only capable of inflammation by itſelf, but explodes with violence when mixed with common air, upon the contact of flame. Here we muſt conſider, that the vitriolic acid contains a great deal of latent heat, as is evident from mixing it with water, when the mixture grows very hot, and ſhrinks in bulk. This will likewiſe happen when the diluted acid is poured upon iron filings; for then the mixture again grows hot, which ſhows an extrication of heat formerly latent ſomewhere. Along with this heat, the phlogiſton of the metal is diſcharged, and of conſequence the latter abſorbs as much fire as it conveniently can. The union is here perfectly complete: for as it is made beneath the ſurface of an aqueous fluid with which the phlogiſton has but little tendency to unite, (for oil and water do not readily mix with one another), the inflammable principle abſorbs juſt as much of the fire as it can contain; the ſuperfluous quantity being diſſipated in the air. It then remains an inviſible, elaſtic, and very light vapour; becauſe the greateſt part of its compoſition is pure fire, which never could be proved to have any weight; and therefore inflammable air is much lighter than common air, which always has a conſiderable quantity of water in its compoſition.—This being the caſe, it is plain, that when any flaming body is immerſed in this vapour, that part of the vapour which touches the flame muſt be kindled, and the phlogiſton, being emptied of the greateſt part of the fire it contained, will now combine with the common air, and phlogiſticate it; that is, it will combine, looſely with it, and, not having ſo much fire as it could contain, will greedily attract more from every ignited ſubſtance which comes in its way, and will therefore extinguiſh fire as far as its operation goes.

It remains only now to ſhew the reaſon of the exploſion of inflammable air when mixed with common air; and this moſt probably ariſes from the extreme inflammability of the phlogiſtic vapour when fully ſaturated with heat. By this means almoſt every part of it takes fire at the ſame inſtant; and thus a conſiderable quantity of air being violently heated at the ſame moment, muſt expand in proportion, and a conſiderable exploſion take place. When dephlogiſticated air is mixed with inflammable air, the exploſion is much greater; and the reaſon is plain, becauſe in common air there is always a quantity of phlogiſtic vapour not ſaturated with heat. This vapour abſorbs a quantity of the heat thrown out by the decompoſed inflammable air; and conſequently leſſens that which is communicated to the common air, and on which the exploſion depends. But in the dephlogiſticated air, as little or no vapour of this kind exiſts, the heat which the inflammable air throws out is almoſt all communicated to the former, and therefore the exploſion is much greater; eſpecially as dephlogiſticated air increaſes the power of any kind of flame to ſuch a degree, that by its means the heat of common fire is made equal to that of a burning mirror.

2. When inflammable air is produced from a diſtillation of wood or any other kind of inflammable ſubſtance, it is emitted at the time that the oil comes over: and therefore we may juſtly conclude, that it is nothing elſe than a part of the vapour of that oil which has imbibed ſo much fire, and is become ſo intimately combined with it that it cannot be condenſed without an entire decompoſition; for this is the caſe with inflammable vapours when they have got a certain quantity of this fluid in them. Thus, the groſs vapour is raiſed by the fire, but is not thoroughly penetrated by it. The fire indeed expands it till it becomes lighter than the common atmoſphere. It is hot to the touch, and therefore its heat is ready to be abſorbed by every cold ſubſtance

which it touches; of conſequence the vapour condenſes without inflammation: but when the fire has entered into a more cloſe combination with it, ſo that the expanſile force of that element is totally confined by the particles of the oil, the vapour is then cold to the touch, yet ſo full of *internal* or *latent* heat, that it is ready to take fire on the ſlighteſt contact of a burning body. The vapour is then inflammable and incondenſible; and, being perfectly tranſparent and inviſible, is called *inflammable air*.

3. The production of inflammable air from vitriolic ether is ſo eaſily accounted for after what has been ſaid, that little further notice needs be taken of it: only it may be obſerved, that the vapour of ether itſelf, even when in its condenſible ſtate, will explode when mixed with common air; which ſeems to ſhow very clearly, that we are not to look upon inflammable air, when incondenſible and perfectly inviſible, as any other thing than an exceedingly ſubtile vapour or thin ſmoke, and conſequently that the phlogiſton itſelf is only the oily particles which conſtitute that vapour.

23
Diminution of air by phlogiſton explained.

We muſt now inquire into that remarkable property of phlogiſton by which it always diminiſhes air when mixed with it. In order to underſtand this, it will be neceſſary to conſider by what means the bulk of air is diminiſhed. This, if we except mechanical compreſſion, can only be done by taking away either part of its elaſticity, or ſome of its other component parts. Now, it hath been ſhown under the article Fluidity, that all fluids contain a great quantity of latent heat; nay, that on this principle their fluidity entirely depends. Of conſequence, the air muſt contain a great quantity of latent heat; and if any ſubſtance capable of abſorbing this heat is preſented to it, the air muſt be diminiſhed. This is the caſe with phlogiſton; and therefore air is always found to be diminiſhed in conſequence of being phlogiſticated. But in proportion as the air loſes this heat, and the phlogiſton imbibes it, it is plain that the latter muſt become more and more ſaturated with it, and of conſequence approach nearer and nearer to an inflammable ſtate. Hence we may account for the change of nitrous into inflammable air, mentioned by Dr Prieſtley. But for a more full diſcuſſion of all theſe ſubjects, ſee the articles Inflammable *Air*, Nitrous *Air*, &c. in the APPENDIX.

Before concluding this article, however, it will be proper to take notice of ſome objections which may be brought againſt the theory above laid down.

24
Phlogiſton in the abſtract.

1. It is impoſſible, ſay the objectors, to prove that there is in nature any ſubſtance which properly deſerves the name of *phlogiſton*, or ſole principle of inflammability. We ſee that bodies are capable of being ſet on fire; but before we aſſume the exiſtence of ſuch a principle as phlogiſton in the abſtract, we ought to be able at leaſt to define it, that ſo we might be able to prove its exiſtence in different bodies. But, as matters ſtand at preſent, it is impoſſible for us even to know when we have gained our point. How is it poſſible, for inſtance, to know whether the phlogiſton in ſpirit of wine be exactly the ſame with that in ſulphur? Or, by what means can we be aſcertained that it is the ſame principle which gives the ſplendor to metals that cauſes bodies emit a flame?

To this it may be replied, that philoſophers in general have attributed all theſe phenomena to one cauſe: therefore every inquirer ought to ſearch among the natural cauſes, in order to find one which is capable of producing all theſe phenomena; and if he finds ſuch an one, there is the higheſt probability that there is no other; for nature doth not multiply cauſes where one will ſerve. Hence it is incumbent on thoſe who would aſſume two principles of inflammability, to prove the exiſtence of them both; but there is not the ſame obligation upon thoſe who aſſume the exiſtence only of one to prove that no more exiſt.

2. Though bodies may be inflamed, and have a prediſpoſition to be inflamed in certain circumſtances, we are not therefore bound to ſuppoſe that this prediſpoſition conſiſts in the admixture of any material ſubſtance with them.

Here we muſt attend to the conſequence of inflammation, which is a ſeparation of the body into matter of two different kinds; one of which remains, while the other is carried off. As ſoon as this volatile matter is entirely diſſipated, the inflammation ceaſes. The probability therefore is exceedingly ſtrong, that this matter either is the principle of inflammability itſelf, or contains it.

PHLOGONIÆ, a claſs of compound, inflammable, and metallic foſſils, found in ſmall maſſes of determinately angular figures; comprehending the pyricubia, pyroctogonia, and pyripolygonia.

PHLOMIS, the Sage-tree, or *Jeruſalem Sage*; a genus of the gymnoſpermia order, belonging to the didynamia claſs of plants. There are 14 ſpecies, all of which have perennial roots, and of many the ſtalks alſo are perennial. The latter riſe from two to five or ſix feet high; and are adorned with yellow, blue, or purple flowers in whorls. They are all ornamental plants; and deſerve a place in gardens, as they are ſufficiently hardy to endure the ordinary winters in this climate: they require, however, a pretty warm ſituation. They may be propagated by offsets, or cuttings.

PHLOX, Lychnidea, or *Baſtard Lychnis*; a genus of the monogynia order, belonging to the pentandria claſs of plants. There are ſeven ſpecies, all of them natives of North America. They have perennial roots, from which ariſe herbaceous ſtalks from nine inches to two feet in height, adorned with tubulated flowers of a purple colour. They are propagated by offsets, and will bear the winters in this country. They require a moiſt rich ſoil, in which they thrive better and grow taller than in any other.

PHLYCTENÆ, in medicine, ſmall eruptions on the ſkin.

PHOCA, in zoology, a genus of quadrupeds of the order of feræ. There are ſix parallel foreteeth in the upper jaw, the outermoſt being larger; and four blunt, parallel, diſtinct, equal fore-teeth in the under jaw. There is but one dog-tooth, and five or ſix three-pointed grinders; and the hind feet are united ſo as to reſemble a ſhip's tail. There are three ſpecies, viz.

1. The urſina, or ſea-bear, has external ears. The male is greatly ſuperior in ſize to the female. The bodies of each are of a conic form, very thick before, and taper to the tail. The length of a large one is eight feet; the greateſt circumference, five feet; near the tail, 20 inches; and the weight is about 800 lb. The noſe projects like that of a pug-dog, but the head

riſes ſuddenly; the teeth lock into one another when the mouth is ſhut; the tongue is large; the eyes are large and prominent, and may be covered at pleaſure by a fleſhy membrane. The length of the fore-legs is 24 inches; they are like thoſe of other quadrupeds, not immerſed in the body like thoſe of ſeals; the feet are formed with toes like thoſe of other animals, but are covered with a naked ſkin, ſo that externally they ſeem to be a ſhapeleſs maſs; the hind-legs are fixed to the body quite behind, like thoſe of ſeals; but are capable of being brought forward, ſo that the animal makes uſe of them to ſcratch its head.

Theſe animals are found in the northern ſeas. During the three months of ſummer they lead a moſt indolent life: they arrive at the iſlands vaſtly fat; but during that time they are ſcarce ever in motion, confine themſelves for whole weeks to one ſpot, ſleep a great part of the time, eat nothing, and, except the employment the females have in ſuckling their young, are totally inactive. They live in families: each male has from 8 to 50 females, whom he guards with the jealouſy of an eaſtern monarch; and though they lie by thouſands on the ſhores, each family keeps itſelf ſeparate from the reſt, and ſometimes, with the young and unmarried ones, amount to 120. The old animals, which are deſtitute of females, or deſerted by them, live apart, and are exceſſively ſplenitic, peeviſh, and quarrelſome: are exceeding fierce, and ſo attached to their old haunts, that they would die ſooner than quit them. They are monſtrouſly fat, and have a moſt hircine ſmell. If another approaches their ſtation, they are rouſed from their indolence, and inſtantly ſnap at it, and a battle enſues; in the conflict, they perhaps intrude on the ſeat of another: this gives new cauſe of offence, ſo in the end the diſcord becomes univerſal, and is ſpread through the whole ſhore.

The other males are alſo very iraſcible: the cauſes of their diſputes are generally theſe. The firſt and moſt terrible is, when an attempt is made by another to ſeduce one of their miſtreſſes or a young female of the family. This inſult produces a combat; and the conqueror is immediately followed by the whole ſeraglio, who are ſure of deſerting the unhappy vanquiſhed. The ſecond reaſon of a quarrel is, when one invades the ſeat of another: the third ariſes from their interfering in the diſputes of others. Theſe battles are very violent; the wounds they receive are very deep, and reſemble the cuts of a ſabre. At the end of a fight they fling themſelves into the ſea, to waſh away the blood.

The males are very fond of their young, but very tyrannical towards the females: if any body attempts to take their cub, the male ſtands on the defenſive, while the female makes off with the young in her mouth; ſhould ſhe drop it, the former inſtantly quits his enemy, falls on her, and beats her againſt the ſtones, till he leaves her for dead. As ſoon as ſhe recovers, ſhe comes in the moſt ſuppliant manner to the male, crawls to his feet, and waſhes them with her tears: he, in the mean time, ſtalks about in the moſt inſulting manner; but in caſe the young one is carried off, he melts into the deepeſt affliction, and ſhews all ſigns of extreme concern. It is probable that he feels his misfortunes the more ſenſibly, as the female generally brings but one at a time, never more than two.

They ſwim very ſwiftly, at the rate of ſeven miles an hour. If wounded, they will ſeize on the boat, and carry it along with vaſt impetuoſity, and oftentimes ſink it. They can continue a long time under water. When they want to climb the rocks, they faſten with the fore-paws, and ſo draw themſelves up. They are very tenacious of life, and will live for a fortnight after receiving ſuch wounds as would immediately deſtroy any other animal.

2. The leonina, or ſea-lion, is found near the ſouth pole. One variety of this ſpecies is deſcribed at ſome length by the publiſher of Anſon's voyage. However, according to others who have written on this ſubject, the name of *ſea-lion* belongs not ſo properly to this as to another, which has a mane like a true lion. Of theſe we have the following account from Pernety's Hiſtorical Journal. "The hair that covers the back part of the head, neck, and ſhoulders, is at leaſt as long as the hair of a goat. It gives this amphibious animal an air of reſemblance to the common lion of the foreſt, excepting the difference of ſize. The ſea-lions of the kind I ſpeak of, are 25 feet in length, and from 19 to 20 in their greateſt circumference. In other reſpects they reſemble the ſea-lions. Thoſe of the ſmall kind have a head reſembling a maſtiff's, with cloſe cropt ears.

"The teeth of the ſea-lions which have manes, are much larger and more ſolid than thoſe of the reſt. In theſe, all the teeth which are inſerted into the jawbone are hollow. They have only four large ones, two in the lower and two in the upper jaw. The reſt are not even ſo large as thoſe of a horſe. I brought home one belonging to the true ſea-lion, which is at leaſt three inches in diameter, and ſeven in length, though not one of the largeſt. We counted 22 of the ſame ſort in the jaw-bone of one of theſe lions, where five or ſix were wanting. They were entirely ſolid, and projected ſcarce more than an inch or an inch and a half beyond their ſockets. They are nearly equal in ſolidity to flint, and are of a dazzling white. Several of our ſeamen took them for white flints when they found them upon the ſhore. I could not even perſuade them that they were not real flints, except by rubbing them againſt each other, or breaking ſome pieces off, to make them ſenſible that they exhaled the ſame ſmell as bones and ivory do when they are rubbed or ſcraped.

"Theſe ſea-lions that have manes, are not more miſchievous or formidable than the others. They are equally unwieldy and heavy in their motions; and are rather diſpoſed to avoid than to fall upon thoſe who attack them. Both kinds live upon fiſh and water-fowl, which they catch by ſurpriſe. They bring forth and ſuckle their young ones among the corn-flags, where they retire at night, and continue to give them ſuck till they are large enough to go to ſea. In the evening you ſee them aſſembling in herds upon the ſhore, and calling their dams in cries ſo much like lambs, calves, and goats, that, unleſs appriſed of it, you would eaſily be deceived. The tongue of theſe animals is very good eating: we preferred it to that of an ox or calf. For a trial we cut off the tip of the tongue hanging out of the mouth of one of theſe lions which was juſt killed. About 16 or 18 of us eat each a pretty large piece, and we all thought it ſo good, that we regretted we could not cut more of it.

" It is ſaid that their fleſh is not abſolutely diſagreeable. I have not taſted it : but the oil which is extracted from their greaſe is of great uſe. This oil is extracted two ways ; either by cutting the fat in pieces, and melting it in large cauldrons upon the fire; or by cutting it in the ſame manner upon hurdles, or pieces of board, and expoſing them to the ſun, or only to the air: this greaſe diſſolves of itſelf, and runs into veſſels placed underneath to receive it. Some of our ſeamen pretended, that this laſt ſort of oil, when it is freſh, is very good for kitchen uſes : this, as well as the other, is commonly uſed for dreſſing leather for veſſels, and for lamps. It is preferred to that of the whale: it is always clear, and leaves no ſediment.

" The ſkins of the ſea-lions are uſed chiefly in making portmanteaus, and in covering trunks. When they are tanned, they have a grain almoſt like Morocco. They are not ſo fine, but are leſs liable to tear, and keep freſh a longer time. They make good ſhoes and boots, which, when well ſeaſoned, are water-proof.

" One day Mr Guyot and ſome others brought on board five ſea-lioneſſes. They were about ſeven feet long, and three and a half in circumference, tho' their inteſtines were drawn. Theſe gentlemen had landed on a ſmall iſland, where they found a prodigious number of theſe animals, and killed eight or nine hundred of them with ſticks. No other weapon is neceſſary on theſe occaſions. A ſingle blow with a bludgeon, three feet or three feet and a half long, almoſt full at the noſe of theſe animals, knocks them down, and kills them on the ſpot.

" This is not altogether the caſe with the ſea-lions : their ſize is prodigious. Our gentlemen encountered two of them for a long time, with the ſame weapons, without being able to overcome them. They lodged three balls in the throat of one while he opened his mouth to defend himſelf, and three muſket-ſhot in his body. The blood guſhed from his wounds like wine from a tap. However, he crawled into the water and diſappeared. A ſailor attacked the other, and engaged him for a long time, ſtriking him on the head with a bludgeon, without being able to knock him down : the ſailor fell down very near his antagoniſt, but had the dexterity to recover himſelf at the inſtant the lion was going to gorge him. Had he once ſeized him, the man would infallibly have been loſt : the animal would have carried him into the water as they uſually do their prey, and there feaſted upon him. In his retreat to the ſea this animal ſeized a penguin, and devoured him inſtantaneouſly."

3. The vitulina, ſea-calf, or common ſeal, inhabits the European ocean. It has a ſmooth head without external ears. The common length of thoſe taken on the Britiſh coaſts is from five to ſix feet. The fore-legs are deeply immerſed in the ſkin of the body: the hind-legs are placed in ſuch a manner as to point directly backwards : every foot is divided into five toes; and each of thoſe connected by a ſtrong and broad web, covered on both ſides with ſhort hair. The toes are furniſhed with ſtrong claws, well adapted to aſſiſt the animal in climbing the rocks it baſks on: the claws on the hind feet are ſlender, and ſtraight ; except at the ends, which are a little incurvated. The head and noſe are broad and flat, like thoſe of the otter; the neck ſhort and thick ; the eyes large and black ; in lieu of external ears, it has two ſmall orifices : the noſtrils are oblong : on each ſide the noſe are ſeveral long ſtiff hairs ; and above each eye, are a few of the ſame kind. The form of the tongue is ſo ſingular, that were other notes wanting, that alone would diſtinguiſh it from all other quadrupeds ; being forked, or ſlit at the end. The cutting teeth are ſingular in reſpect to their number, being ſix in the upper jaw, and only four in the lower. It has two canine teeth above and below, and on each ſide of the jaw five grinders ; the total 34. The whole animal is covered with ſhort hair, very cloſely ſet together : the colour of that on the body is generally duſky, ſpotted irregularly with white ; on the belly, white : but ſeals vary greatly in their marks and colours, and ſome have been found entirely white.

The ſeal is common on moſt of the rocky ſhores of Great Britain and Ireland, eſpecially on the northern coaſts : in Wales, it frequents the coaſts of Caernarvonſhire and Angleſey. It preys entirely on fiſh, and never moleſts the ſea-fowl : for numbers of each are often ſeen floating on the waves, as if in company. Seals eat their prey beneath the water ; and in caſe they are devouring any very oily fiſh, the place is known by a certain ſmoothneſs of the waves immediately above. The power of oil in ſtilling the waves excited by a ſtorm, is mentioned by Pliny : the moderns have made the experiment with ſucceſs ; and thereby made one advance towards eradicating the vulgar prejudices againſt that great and elegant writer.

Seals are excellent ſwimmers, and ready divers; and are very bold when in the ſea, ſwimming careleſsly enough about boats : their dens or lodgments are in hollow rocks, or caverns, near the ſea, but out of the reach of the tide : in the ſummer they will come out of the water, to baſk or ſleep in the ſun, on the top of large ſtones or ſhivers of rocks ; and that is the opportunity our countrymen take of ſhooting them : if they chance to eſcape, they haſten towards their proper element, flinging ſtones and dirt behind them, as they ſcramble along ; at the ſame time expreſſing their fears by piteous moans ; but if they happen to be overtaken, they will make a vigorous defence with their feet and teeth till they are killed. They are taken for the ſake of their ſkins, and for the oil their fat yields : the former ſell for 4 s. or 4 s. 6 d. a-piece ; which, when dreſſed, are very uſeful in covering trunks, making waiſtcoats, ſhot-pouches, and ſeveral other conveniencies.

The fleſh of theſe animals, and even of porpeſes, formerly found a place at the tables of the great ; as appears from the bill of fare of that vaſt feaſt that archbiſhop Nevill gave in the reign of Edward IV. in which is ſeen that ſeveral were provided on the occaſion. They couple about April, on large rocks, or ſmall iſlands, not remote from the ſhore ; and bring forth in thoſe vaſt caverns that are frequent on our coaſts ; they commonly bring two at a time, which in their infant ſtate are covered with a whitiſh down, or woolly ſubſtance. The ſeal-hunters in Caithneſs ſay, that their growth is ſo ſudden, that in nine tides from their birth (54 hours) they will become as active as their parents. On the coaſt of that country are immenſe caverns opening into the ſea, and running ſome hundreds of yards beneath the land. Theſe are the reſort of ſeals in the breeding time, where they continue till their young are old enough to go to ſea, which is in about ſix or ſeven weeks. The firſt of theſe caves is near the Ord, the laſt near Thrumſter: their entrance is ſo narrow, as only to admit a boat; their inſide very ſpacious and lofty. In the month of October, or the beginning of November, the ſeal-hunters enter the mouths of the caverns about midnight, and rowing up as far as they can, they land; each of them being provided with a bludgeon, and properly ſtationed, light their torches, and make a great noiſe, which brings down the ſeals from the farther end in a confuſed body with fearful ſhrieks and cries: at firſt the men are obliged to give way for fear of being overborne; but when the firſt crowd is paſt, they kill as many as ſtraggle behind, chiefly the young, by ſtriking them on the noſe; a very ſlight blow on that part diſpatches them. When the work is over, they drag the ſeals to the boat, which two men are left to guard. This is a moſt hazardous employ; for ſhould their torches go out, or the wind blow hard from ſea during their continuance in the cave, their lives are loſt. The young ſeals of ſix weeks age, yield more oil than their emaciated dams: above eight gallons have been got from a ſingle whelp, which ſells from 6 d. to 9 d. per gallon; the ſkins from 6 d. to 12 d. each.

ennant's *Britiſh* *oology.*

The natural hiſtory of this animal may be further elucidated, by the following extracts from a letter of the reverend Dr William Borlaſe, dated October the 24th, 1763. "The ſeals are ſeen in the greateſt plenty on the ſhores of Cornwall, in the months of May, June, and July. They are of different ſizes; ſome as large as a cow, and from that downwards to a ſmall calf. They feed on moſt ſorts of fiſh which they can maſter; and are ſeen ſearching for their prey near ſhore, where the whiſtling fiſh, wraws, and polacks, reſort. They are very ſwift in their proper depth of water, dive like a ſhot, and in a trice riſe at 50 yards diſtance; ſo that weaker fiſhes cannot avoid their tyranny, except in ſhallow water. A perſon of the pariſh of Sennan, ſaw not long ſince a ſeal in purſuit of a mullet (that ſtrong and ſwift fiſh): the ſeal turned it to and fro in deep water, as a gre-hound does a hare: the mullet at laſt found it had no way to eſcape, but by running into ſhoal water: the ſeal purſued; and the former, to get more ſurely out of danger, threw itſelf on its ſide, by which means it darted into ſhoaler water than it could have ſwam in with the depth of its paunch and fins, and ſo eſcaped. The ſeal brings her young about the beginning of autumn; our fiſhermen have ſeen two ſucking their dam at the ſame time, as ſhe ſtood in the ſea in a perpendicular poſition. Their head in ſwimming is always above water, more ſo than that of a dog. They ſleep on rocks ſurrounded by the ſea, or on the leſs acceſſible parts of our cliffs left dry by the ebb of the tide; and if diſturbed by any thing, take care to tumble over the rocks into the ſea. They are extremely watchful, and never ſleep long without moving; ſeldom longer than a minute; then raiſe their heads, and if they hear or ſee nothing more than ordinary, lie down again, and ſo on, raiſing their heads a little and reclining them alternately in about a minute's time. Nature ſeems to have given them this precaution, as being unprovided with auricles or external ears; and conſequently not hearing very quick, nor from any great diſtance."

PHOCÆA, the laſt town of Ionia, (Mela, Pliny); of Æolis, (Ptolemy), becauſe ſituated on the right or north ſide of the river Hermus, which he makes the boundary of Æolis to the ſouth. It ſtood far in the land, on a bay or arm of the ſea; had two very ſafe harbours, the one called *Lampter*, the other *Nauſtathmos*, (Livy). It was a colony of Ionians, ſituated in the territory of Æolis, (Herodotus). Maſſilia in Gaul was again a colony from it. *Phocæenſes*, the people, (Livy); *Phocaicus*, the epithet, (Lucan); applied to *Marſeilles*. It was one of the 12 cities which aſſembled in the panionium, or general council of Ionia.

PHOCION, an Athenian general, and a great orator. Demoſthenes himſelf was afraid of his eloquence. Philip of Macedon had ſo great an eſteem of his courage and military conduct, that he dreaded him. He had as much moderation as Demoſthenes had vehemence; and by his prudent counſels diverted Alexander from a war with the Athenians and with all Greece. Alexander ſent him preſents, and told him he was the only perſon in Athens whom he acknowledged to be an honeſt man: Phocion at the ſame time was drawing water out of the well, and his wife was making of bread; yet he wiſely refuſed the preſents. Antipater alſo offered him great ſums of money, which he likewiſe returned: his innocence and virtue rendered his poverty honourable. He was obliged to take up arms in defence of his country; and his conduct was ſucceſsful againſt Philip of Macedon, and upon ſeveral other occaſions. He was at laſt condemned on a falſe accuſation of treaſon by his ungrateful fellow-citizens, and put to death 318 B.C. After which the Athenians erected him a ſtatue, and cut off his accuſer.

PHOCIS, (Demoſthenes, Strabo, Pauſanias); a country of Greece, contained between Bœotia to the eaſt, and Locris to the weſt, but extending formerly from the Sinus Corinthiacus on the ſouth, to the ſea of Eubœa on the north, and, according to Dionyſius, as far as Thermopylæ; but reduced afterwards to narrower bounds. *Phocenſes* the people; *Phocicus*, the epithet, (Juſtin); *Bellum Phocicum*, the ſacred war which the Thebans and Philip of Macedon carried on againſt them for plundering the temple at Delphi; and by which Philip paved the way to the ſovereignty of all Greece, (Juſtin.)

PHOEBUS, one of the names given by ancient mythologiſts to the Sun, Sol, or Apollo. See APOLLO.

PHOENICIA, or more properly PHOENICE, the ancient name of a country lying between the 34th and 36th degrees of north latitude; bounded by Syria on the north and eaſt, by Judæa on the ſouth, and by the Mediterranean on the weſt. Of its name there are various derivations given. Some derive it from a chief named *Phœnix*: others from the Greek word *Phœnix*, ſignifying a palm or date; as if that tree had abounded remarkably in this country. According to Bochart, its moſt probable etymology is *Phene Anak*, that is, "the deſcendants of Anak."

It is univerſally allowed, that the Phœnicians were deſcendants of the Canaanites. Their country, however, ſmall as it was, comprehended ſeveral kingdoms, viz. Sidon, Tyre, Aradus, and Byblus. Of none of theſe we have any certain hiſtory excepting Tyre and Sidon, which is given under theſe articles in the order of the alphabet. But their language and religion were diffuſed over ſeveral nations who proceeded from them as colonies, particularly the Carthaginians, and are therefore better known.

The language of the Phœnicians was little different from that of the ancient Canaanites, and conſequently a dialect of the Hebrew. Their characters were either the very ſame with the Samaritan, or but little different from them. The ſame may be ſaid of the language of the Carthaginians, who, being a Phœnician colony, muſt originally have ſpoken the ſame with that of the mother-country. However, it is probable that in after-ages it differed conſiderably. This indeed has been fully proved by Selden, Scaliger, Pitt, and Bochart, the laſt of whom has collected a number of Punic words, and traced all of them up to the Hebrew or Phœnician. A few of theſe words are given in the following table.

Hebrew or Phœnician.	Punic.
Zachæus	Sichæus.
Amalec	Amilco, or Himilco.
Hinnon, or Hanun	Hanno.
Hannabaal, or Baal-Hanan	Hannibal.
Ezra, or Ezdras-Baal	Aſdrubal.
Barac	Barca.
Magog	Mago
Adar, or Ader-baal	Adherbal.
Mehir, or Maher-baal	Maherbal.

According to Priſcian and St Auſtin, the Punic or Carthaginian language had an admixture of the Chaldee and Syriac; and Salmaſius intimates, that, according to ſome, the Punic language agreed in many reſpects with the Egyptian. Nay, M. Maius, profeſſor of the Greek and Oriental languages in the Ludovician Univerſity of Gieſſen, publiſhed a ſmall piece in the year 1718, wherein he ſhows, that the language of the modern Malteſe has a great deal of the old Punic in it, and that theſe words are farther diſtant from the Arabic than from the ancient Hebrew or Chaldee.

With regard to religion, the Phœnicians were the moſt groſs and abominable idolaters. The Baal-berith, Baalzebub, Baalſamen, &c. mentioned in Scripture were ſome of the Phœnician gods; as were alſo the Moloch, Aſhtaroth, and Thammuz, mentioned in the ſacred writings.—The word *Baal*, in itſelf an appellative, was no doubt applied to the true God, until he rejected it on account of its being ſo much profaned by the idolaters. The name was not appropriated to any particularly deity among the idolatrous nations, but was common to many; however, it was generally imagined that one great God preſided over all the reſt. Among the Phœnicians this deity was named *Baal-ſamen*, whom the Hebrews would have callen *Baal-ſhemim*, or the God of heaven. In all probability this was alſo the principal Carthaginian deity, though his Punic name is unknown. We have many religious rites of the Carthaginians handed down to us by the Greek and Roman writers; but they all beſtowed names of their own gods upon thoſe of the Carthaginians, which leads us to a knowledge of the correſpondence between the characters of the Phœnician and European deities. The principal deity of Carthage, according to Diodorus Siculus, was Chronus or Saturn. The ſacrifices offered up to him were children of the beſt families. Our author alſo tells us, that the Carthaginians had a brazen ſtatue or coloſſus of this god, the hands of which were extended in act to receive, and bent downwards in ſuch a manner, that the child laid thereon immediately fell down into a hollow where there was a fiery furnace. He adds alſo, that this inhuman practice ſeemed to confirm a tradition handed down to the Greeks from very early antiquity, viz. that Saturn devoured his own children.

The goddeſs Cœleſtis, or Urania, was held in the higheſt veneration by the Carthaginians. She is thought to have been the ſame with the queen of heaven mentioned in Jeremiah, the Juno Olympia of the Greeks. According to Heſychius the ſame word applied in the Punic langage both to Juno and Venus. Nay, the ancient Greeks frequently confound Juno, Venus, and Diana or the moon, all together; which is to be attributed to the Egyptians and Phœnicians, from whom they received their ſyſtem of religion; who ſeem in the moſt ancient times to have had but one name for them all. Beſides theſe there were ſeveral other deities of later date, who were worſhipped among the Phœnicians, particularly thoſe of Tyre, and conſequently among the Carthaginians alſo. Theſe were Jupiter, Apollo, Mars, and Bacchus. Jupiter was worſhipped under the name of *Belus* or *Baal*. To him they addreſſed their oaths, and placed him for the moſt part, as there is reaſon to believe, at the head of their treaties. The ſame name was alſo given to the other two, whence they were frequently miſtaken for one another. Apollo or the ſun went either by this name ſimply, or by others of which this made a part.

The Carthaginian ſuperſtition, however, was not confined to theſe deities alone. They worſhipped alſo the fire, air, and other elements; and had gods of rivers, meads, &c. Nay, they paid divine honours to the ſpirits of their heroes, and even to men and women themſelves while yet in life; and in this adoration Hannibal the Great had for ſome time a ſhare, notwithſtanding the infamous conduct of his countrymen towards him at laſt. In order to worſhip thoſe gods with more conveniency on all occaſions, the Carthaginians had a kind of portable temples. Theſe were only covered chariots, in which were ſome ſmall images repreſenting their favourite deities; and which were drawn by oxen. They were alſo a kind of oracle, and their reſponſes were underſtood by the motion impreſſed upon the vehicle. This was likewiſe an Egyptian or Libyan cuſtom, and Tacitus informs us that the ancient Germans had ſomething of the ſame kind. The tabernacle of Moloch is thought to have been a machine of this kind, and it is not improbable that the whole was derived from the tabernacle of the Jews in the wilderneſs.

Beſides all the deities abovementioned, we ſtill find another, named the *Dæmon* or *Genius* of Carthage, mentioned in the treaty made by Philip of Macedon and Hannibal. What this deity might be, we know not; however, it may be obſerved, that the pagan world in general believed in the exiſtence of demons, or intelligences who had a kind of middle nature between gods and men, and to whom the adminiſtration of the world was in a great meaſure committed. Hence it is no wonder that they ſhould have received religious honours. For when once mankind were poſſeſſed with the opinion that they were the miniſters of the gods, and truſted with the diſpenſation of their favours, as well as the infliction of their puniſhments, it is natural to ſuppoſe that they would be deſirous of making their addreſſes to them.

PHOENICOPTERUS, or Flamingo, in ornithology, a genus of birds belonging to the order of grallæ. The beak is naked, teethed, and bent as if it was broken; the noſtrils are linear; the feet are palmated, and four-toed. There is but one ſpecies; *viz.* the Bahamenſis of Cateſby, a native of Africa and America.

Plate xxxviii. fig. 1. This bird reſembles the heron in ſhape, excepting the bill, which is of a very ſingular form. It is two years old before it arrives at its perfect colour; and then it is entirely red, excepting the quill-feathers, which are black. A full-grown one is of equal weight with a wild duck; and when it ſtands erect, it is five feet high. The feet are webbed. The fleſh is delicate; and moſt reſembles that of a partridge in taſte. The tongue, above any other part, was in the higheſt eſteem with the luxurious Romans. Theſe birds make their neſts on hillocks in ſhallow water; on which they ſit with their legs extended down, like a man ſitting on a ſtool. They breed on the coaſts of Cuba, and the Bahama iſlands in the Weſt Indies; and frequent ſalt-water only. By reaſon of the particular ſhape of its bill, this bird, in eating, twiſts its neck from ſide to ſide, and makes the upper mandible touch the ground. Theſe birds are very ſtupid, and will not riſe at the report of a gun; nor is it any warning to thoſe who ſurvive, that they ſee others killed by their ſide; ſo that, by keeping himſelf out of a ſight, a fowler may kill as many as he pleaſes.

PHOENIX, in aſtronomy. See there, n° 206.

Phoenix, the *Great Palm*, or *Date-tree*; a genus of plants belonging to the order of palmæ. There is only one ſpecies, *viz.* the dactylifera, or common date-tree, a native of Africa and the eaſtern countries, where it grows to 50, 60, and 100 feet high. The trunk is round, upright, and ſtudded with protuberances, which are the veſtiges of the decayed leaves. From the top iſſues forth a cluſter of leaves or branches eight or nine feet long, extending all round like an umbrella, and bending a little towards the earth. The bottom part produces a number of ſtalks like thoſe of the middle, but ſeldom ſhooting ſo high as four or five feet. Theſe ſtalks, ſays Adanſon, diffuſe the tree very conſiderably; ſo that, wherever it naturally grows in foreſts, it is extremely difficult to open a paſſage through its prickly leaves. The flowers are male and female upon different roots. The dates, which are the produce of the female plant, grow in large ſpiral cluſters, each being about the bigneſs and ſhape of a middling olive, and containing within the pulp, which is of a yellow colour and agreeable taſte, a round, ſtrong, hard nut or ſtone, of an aſh-colour, marked with a deep furrow, running lengthwiſe. Of the freſh dates and ſugar, ſays Haſſelquiſt, the Egyptians make a conſerve, which has a very pleaſant taſte. The kernels or ſtones, though hard as horn, they grind in hand-mills, and, in default of better food, give to their camels. Of the leaves are made baſkets, or bags, which are much uſed in Turky on journeys, and for other œconomical uſes. In Egypt they are uſed as fly-flaps, for driving away the numerous inſects which prove ſo troubleſome in hot countries; and Rauwold relates, that of the fibres of the leaves and covering of the fruit are ſpun ropes, of pretty large dimenſions and conſiderable ſtrength. The hard boughs are uſed for fences and other purpoſes of huſbandry; the principal ſtem for building; in fine, no part of this curious tree wants its uſe. The fruit, before it is ripe, is ſomewhat aſtringent; but when thoroughly mature, is of the nature of the fig. The Senegal dates are ſhorter than thoſe of Egypt, but much thicker in the pulp, which is ſaid to have a ſugary agreeable taſte, ſuperior to that of the beſt dates of the Levant.

Theſe plants may be eaſily produced from the ſeeds taken out of the fruit, (provided they are freſh), which ſhould be ſown in pots filled with light rich earth, and plunged into a moderate hot-bed of tanners bark, which ſhould be kept in a moderate temperature of heat, and the earth frequently refreſhed with water. When the plants are come up to a proper ſize, they ſhould be each planted into a ſeparate ſmall pot, filled with the ſame light earth, and plunged into a hot-bed again, obſerving to refreſh them with water, as alſo to let them have air in proportion to the warmth of the ſeaſon and the bed in which they are placed. During the ſummer-time they ſhould remain in the ſame hot-bed; but in the beginning of Auguſt, you ſhould let them have a great ſhare of air to harden them againſt the approach of winter; for if they are too much forced, they will be ſo tender as not to be preſerved through the winter without much difficulty, eſpecially if you have not the conveniency of a bark-ſtove to keep them in. The ſoil in which theſe plants ſhould be placed, muſt be compoſed in the following manner, viz. half of light freſh earth taken from a paſture-ground, the other half ſea-ſand and rotten dung or tanners bark in equal proportion; theſe ſhould be carefully mixed, and laid in a heap three or four months at leaſt before it is uſed, but ſhould be often turned over to prevent the growth of weeds, and to ſweeten the earth.

Phoenix, in ornithology, a bird famous among the ancients, but generally looked upon by the moderns as fabulous. The ancients ſpeak of this bird as ſingle, or the only one of its kind; they deſcribe it as of the ſize of an eagle; its head finely creſted with a beautiful plumage, its neck covered with feathers of a gold colour, and the reſt of its body purple, only the tail white, and the eyes ſparkling like ſtars: they hold, that it lives 500 or 600 years in the wilderneſs; that when thus advanced in age, it builds itſelf a pile of ſweet wood and aromatic gums, and fires it with the wafting of its wings, and thus burns itſelf; and that from its aſhes ariſes a worm, which in time grows up to be a phœnix. Hence the Phœnicians gave the name of *phœnix* to the palm-tree; becauſe when burnt down to the root, it riſes again fairer than ever.

Plate CCXXXVIII fig. 2.

PHOLAS, a genus of inſects, belonging to the order of vermes teſtacea. The ſhell is double-valved and divaricated; the cardo is turned backwards, and connected by a cartilage. There are ſix ſpecies, diſtinguiſhed by the figure of their ſhells.

The word *pholas* is derived from the Greek, and ſignifies ſomething which lies hid. This name they derive from their property of making themſelves holes in the earth, ſand, wood, or ſtone, and living in them. The means of their getting there, however, are as yet entirely unknown. All that we can know with certainty is, that they muſt have penetrated theſe ſubſtances when very ſmall; becauſe the entrance of the hole in which the pholas lodges is always much leſs than the inner part of it, and indeed than the ſhell of the pholas itſelf. Hence ſome have ſuppoſed that they were hatched in holes accidentally formed in ſtones, and that the ſtones naturally grew of ſuch a ſhape as was neceſſary to fill the cavity.

The holes in which the Pholades lodge are uſually twice as deep, at leaſt, as the ſhells themſelves are long; the figure of the holes is that of a truncated cone, excepting that they are terminated at the bottom by a rounded cavity, and their poſition is uſually ſomewhat oblique to the horizon. The openings of theſe holes are what betray the pholas being in the ſtone; but they are always very ſmall, in proportion to the ſize of the fiſh. There ſeems to be no progreſſive motion of any animal in nature ſo ſlow as that of the pholas; it is immerſed in the hole, and has no movement except a ſmall one towards the centre of the earth; and this is only proportioned to the growth of the animal. Its work is very difficult in its motion; but it has great time to perform it in, as it only moves downward, ſinking itſelf deeper in the ſtone as it increaſes itſelf in bulk. That part by means of which it performs this, is a fleſhy ſubſtance placed near the lower extremity of the ſhell; it is of the ſhape of a lozenge, and is conſiderably large in proportion to the ſize of the animal; and though it be of a ſoft ſubſtance, it is not to be wondered at that in ſo long a time it is able, by conſtant work, to burrow into a hard ſtone. The manner of their performing this may be ſeen by taking one of them out of the ſtone, and placing it upon ſome ſoft clay; for they will immediately get to work in bending and extending that part allotted to dig for them, and in a few hours they will bury themſelves in the mud in as large a hole as they had taken many years to make in the ſtone. They find little reſiſtance in ſo ſoft a ſubſtance, and the neceſſity of their hiding themſelves evidently makes them haſten their work. The animal is lodged in the lower half of the hole in the ſtone, and the upper half is filled up by a pipe of a fleſhy ſubſtance and conic figure, truncated at the end: this they uſually extend to the orifice of the hole, and place on a level with the ſurface of the ſtone; but they ſeldom extend it any farther than this. The pipe, tho' it appears ſingle, is in reality compoſed of two pipes, or at leaſt it is compoſed of two parts ſeparated by a membrane. The uſe of this pipe or proboſcis, is the ſame with that of the proboſcis of other ſhell-fiſh, to take in ſea-water into their bodies, and afterwards to throw it out again. In the middle of their bodies they have a ſmall green veſſel, the uſe of which has not yet been diſcovered. This, when plunged in ſpirit of wine, becomes of a purple colour: but its colour on linen will not become purple in the ſun like that of the murex; and even if it would, its quantity is too ſmall to make it worth preſerving.

The pholas is remarkable for its luminous quality. That this fiſh is luminous was noticed by Pliny, who obſerves that it ſhines in the mouth of the perſon who eats it; and, if it touch his hands or cloaths, makes them luminous. He alſo ſays that the light depends upon its moiſture. The light of this fiſh has furniſhed matter for various obſervations and experiments to M. Reaumur and the Bolognian academicians, eſpecially Beccarius, who took ſo much pains with the ſubject of phoſphoreal light.

M. Reaumur obſerves, that whereas other fiſhes give light when they tend to putreſcence, this is more luminous in proportion to its being freſh; that when they are dried, their light will revive if they be moiſtened either with freſh or ſalt water, but that brandy immediately extinguiſhes it. He endeavoured to make this light permanent, but none of his ſchemes ſucceeded.

The attention of the Bolognian academicians was engaged to this ſubject by M. F. Marſilius, in 1724, who brought a number of theſe fiſhes, and the ſtones in which they were incloſed, to Bologna, on purpoſe for their examination.

Beccarius obſerved, that though this fiſh ceaſed to ſhine when it became putrid, yet that in its moſt putrid ſtate, it would ſhine, and make the water in which it was immerſed luminous when it was agitated. Galeatius and Montius found that wine or vinegar extinguiſhed this light; that in common oil it continued ſome days, but in rectified ſpirit of wine or urine hardly a minute.

In order to obſerve in what manner this light was affected by different degrees of heat, they made uſe of a Reaumur's thermometer, and found that water rendered luminous by theſe fiſhes increaſed in light till the heat arrived to 45°, but that it then became ſuddenly extinct, and could not be revived again.

In the experiments of Beccarius, a ſolution of ſea-ſalt increaſed the light of the luminous water, a ſolution of nitre did not increaſe it quite ſo much. Sal ammoniac diminiſhed it a little, oil of tartar *per deliquium* nearly extinguiſhed it, and the acids entirely. This water poured upon freſh calcined gypſum, rock cryſtal, ceruſs, or ſugar, become more luminous. He alſo tried the effects of it when poured upon various other ſubſtances, but there was nothing very remarkable in them. Afterwards, uſing luminous milk, he found that oil of vitriol extinguiſhed the light, but that of tartar increaſed it.

This gentleman had the curioſity to try how differently coloured ſubſtances were affected by this kind of light; and having, for this purpoſe, dipped ſeveral ribbons in it, the white came out the brighteſt, next to this was the yellow, and then the green; the other colours could hardly be perceived. It was not, however, any particular colour, but only light, that was perceived in this caſe. He then dipped boards painted with the different colours, and alſo glaſs tubes filled with ſubſtances of different colours, in water rendered luminous by the fiſhes. In both theſe caſes, the red was hardly viſible, the yellow was the brighteſt, and the violet the dulleſt. But on the boards, the blue was nearly equal to the yellow, and the green more languid; whereas in the glaſſes, the blue was inferior to the green.

Of all the liquors to which he put the pholades, milk was rendered the moſt luminous. A ſingle pholas made ſeven ounces of milk ſo luminous, that the faces of perſons might be diſtinguiſhed by it, and it looked as if it was tranſparent.

Air appeared to be neceſſary to this light; for when Beccarius put the luminous milk into glaſs tubes, no agitation would make it ſhine, unleſs bubbles of air were mixed with it. Alſo Montius and Galeatius found, that, in an exhauſted receiver, the pholas loſt its light, but the water was ſometimes made more luminous; which they aſcribed to the riſing of bubbles of air through it.

Beccarius, as well as Reaumur, had many ſchemes to render the light of theſe pholades permanent. For this purpoſe he kneaded the juice into a kind of paſte with flour, and found that it would give light when it was immerſed in warm water; but it anſwered beſt to preſerve the fiſh in honey. In any other method of preſervation, the property of becoming luminous would not continue longer than ſix months, but in honey it had laſted above a year; and then it would, when plunged in warm water, give as much light as ever it had done.

PHONICS, the doctrine or ſcience of ſounds, otherwiſe called ACOUSTICS. See that article.

PHOSPHORUS, a name given to certain ſubſtances which ſhine in the dark without emitting heat. By this circumſtance they are diſtinguiſhed from the *pyrophori*, which though they take fire on being expoſed to the air, are yet entirely deſtitute of light before this expoſure.

Phoſphori are divided into ſeveral kinds, known by the names of *Bolognian phoſphorus*, *Mr Canton's phoſphorus*, *Baldwin's phoſphorus*, *phoſphorus of urine*, &c. of which the laſt is by far the moſt remarkable both with reſpect to the quantity of light which it emits, and its property of taking fire and burning very fiercely upon being ſlightly heated or rubbed. For the method of preparing theſe, ſee CHEMISTRY, n° 193, 476—486.

Beſides theſe, however, it has been found that almoſt all terreſtrial bodies, upon being expoſed to the light, will appear luminous for a little time in the dark, metals only excepted. This points out a general diviſion of the phoſphori into two claſſes; namely, ſuch as require to be expoſed to the light either of the ſun, or of ſome artificial fire, before they become luminous; and ſuch as do not. Of the former kind are the Bolognian phoſphorus, Mr Canton's phoſphorus, the phoſphori from earths, &c. Of the latter kind are rotten wood, the ſkins of fiſhes, and the phoſphorus of urine. To theſe we may add ſome other ſubſtances which become luminous in another way; *viz.* the maſs which remains after the diſtillation of volatile ſal ammoniac with chalk, loaf-ſugar, and the phoſphorus of urine diſſolved in ſpirit of wine. The firſt, which is a compoſition of the marine acid of the ſal ammoniac with the chalk, after being fuſed in a crucible, becomes luminous when ſtruck with any hard body; white ſugar is luminous, when grated or ſcraped in the dark; and the ſolution of phoſphorus in ſpirit of wine is luminous only when dropped into water, and even then the light is only perceived where the drops fall into the liquid. One part of phoſphorus communicates this property to 600,000 parts of ſpirit of wine.

There is a remarkable difference between the light of rotten wood, fiſhes, and that of phoſphorus of urine, even when it is not in an ignited ſtate; for this laſt does not ceaſe to be luminous even when included within an exhauſted receiver, the contrary of which happens to rotten wood and fiſhes. If air is ſtrongly blown upon this phoſphorus from a pair of bellows, it will extinguiſh its light for ſome time, which is not the caſe with the other kinds. When kept in water, and placed in a warm air, the phoſphorus of urine diſcharges ſuch large and bright flaſhes into the air above it, as are apt to ſurpriſe and even frighten thoſe who are unacquainted with it. Theſe coruſcations are contracted in their paſſage through the water, but expand as ſoon as they get above it; however, the experiment can only be tried to advantage in warm weather, and in a cylindrical glaſs not above three quarters filled with water.

The phenomena exhibited by the earthy phoſphori are very curious; both on account of the ſingular circumſtances in which they exhibit their light, and the varieties obſerved in the light itſelf. All theſe, as has been already mentioned, emit no light till they have been firſt expoſed to the light of the ſun, or ſome other luminous body. After that, they are luminous in the dark for a conſiderable time; but by degrees their light dies away, and they emit no more till after another expoſure to the ſun. But if this happens to be too long continued, they are then irrecoverably ſpoiled. The ſame thing will happen from being too much heated without any expoſure to light. Indeed, if a phoſphorus, which has juſt ceaſed to be luminous, be heated, it will again emit light without any expoſure to the ſun; but by this its phoſphoric quality is weakened, and will at laſt be deſtroyed. Indeed theſe phoſphori are ſo tender, and impatient either of light or heat, that the beſt method of rendering them luminous occaſionally is by diſcharging an electric bottle near them. The light of the flaſh immediately kindles the phoſphorus, and it continues luminous for a conſiderable time, after which it may again be revived by another flaſh, and ſo on. However, with all the care that can be taken, theſe phoſphori are very far from being perpetual; nor has any method been yet fallen upon to render them ſo.

The ſingularities in the light of the phoſphori abovementioned are, that they emit light of many different and moſt beautiful colours. This difference of colours ſeems to be natural to them; for ſome will at firſt emit a green, others a red, others a violet, &c. at their formation. However, the beſt kinds agree in this ſtrange property, that if they are expoſed to a red light, they emit a red light in the dark; and the ſame of other colours. But this muſt not be underſtood without limitation; nor is the phoſphoreal light at any time ſo bright as the luminous body, whatever it was, by which it was kindled. Neither are we to imagine, that any particular phoſphorus has a particular kind of light appropriated to it; for the ſame phoſphorus which at one time emits a purple light, will at another perhaps emit a green, or a light of ſome other colour.

The explanation of the principal phenomena of phoſphorus is deducible from what has been ſhown concerning the nature of fire, compared with what is mentioned under the article QUICKLIME. Under this laſt article it is ſhown, that, when calcareous earths are deprived of their fixed air, a proportionable quantity of active fire is abſorbed by them; that is, the etherial fluid, which pervades all bodies, has a violent tendency to expand itſelf, or to act all around every particle of the calcined earth, as from a centre. Of conſequence, if this tendency was not counteracted by ſome other power, theſe ſubſtances would emit a perpetual flame. This power, however, is found in our atmoſphere; which has already been ſhown either to be the poſitive principle of cold, or to contain it *. Hence, the latent fire in theſe ſubſtances is checked, and cannot act, excepting within the very ſubſtance itſelf. But if any other body comes in contact with the calcined earth, in which the principle of cold is leſs vigorous than in the atmoſphere, the active fire in the quicklime immediately ſhows itſelf, and the body either becomes hot, or is conſumed as if by fire. Hence it will follow, that if a very inflammable body is touched by quicklime, it ought to be ſet on fire. But of this we have no inſtance, becauſe it is impoſſible for the quicklime to part with any of its fire, unleſs it receives ſomething in exchange. This indeed it might receive from the atmoſphere; which could ſupply it either with more fire, if it was in a ſtate of ignition; or with fixed air, if any ſubſtance was at hand to receive the fire. But the atmoſphere refuſes to part with the fire which it contains, becauſe the effort of the fire in the quickſilver is not ſufficiently ſtrong to overcome the oppoſition it meets with in other bodies; and, on the other hand, the effort of the fire in the quicklime is ſufficient to keep the earth from attracting fixed air out of the atmoſphere. But when water, for inſtance, is poured on the quicklime, the dry earth abſorbs it very greedily, and parts with a proportionable quantity of its latent fire, which the water alſo abſorbs much more readily than the atmoſphere. Hence the mixture becomes ſo exceedingly hot as ſometimes to fire combuſtible bodies. Now, if inſtead of water we ſuppoſe the lime to be mixed with oil, this alſo will abſorb the fire; but not with ſuch force as the water; neither is the heat by any means ſo conſiderable; becauſe oil is capable of detaining a vaſt quantity of heat in a latent ſtate, the only conſequence of which is an increaſe of its fluidity, without any very perceptible change of temperature. At the ſame time, however, we muſt remember, that if the oil is in very ſmall quantity, and intimately combined with the quicklime in that peculiar ſtate which we call *phlogiſton*, it is eaſy to conceive, that it may be ſo much ſaturated with fire, as to be unable to contain any more without being ignited. In this caſe, if more fire is forced into the compound, a quantity of the phlogiſtic matter which it contains will be decompounded; and of conſequence, the fire which it has imbibed will be thrown out, as in the common ignition of vapour; and in proportion to the degree of heat thus communicated, will the degree of ignition and the continuance of it be. If the quantity of heat is very great, the phlogiſton will be diſſipated all at once; but if otherwiſe, the ignition will continue for a much greater length of time, as is the caſe with a common fire.

To apply this to the accenſion of phoſphori, we muſt conſider, that theſe ſubſtances are all formed by calcining calcareous ſubſtances, and combining them with ſome portion of phlogiſtic matter. Baldwin's phoſphorus is made by diſſolving chalk in the nitrous acid, afterwards evaporating the ſolution, and driving off moſt of the acid. The conſequence of this is, that the earth is left in an exceedingly cauſtic ſtate, as the acid expels the fixed air more completely than could be done almoſt by any calcination whatever; at the ſame time that any phlogiſtic matter which might have been contained in the mixture is moſt accurately diffuſed through it, and combined with it. The Bolognian phoſphorus is compoſed of a gypſeous earth, which contains a quantity of vitriolic acid; and as no mineral is to be found perfectly free from phlogiſtic matter, the vitriolic acid unites with it during the calcination into an exceedingly inflammable ſulphur; for the greater the quantity of acid there is in proportion to the phlogiſton, the more inflammable is the compound †. Thus the Bolognian, as well as Baldwin's phoſphorus, is a compound of quicklime and inflammable matter; and the caſe is ſtill more plain with regard to Mr Canton's, where the quicklime is mixed with ſulphur, and both calcined together.—Neither are the phoſphori made by calcining oyſter-ſhells without addition to be accounted any way different from thoſe already mentioned; ſince the ſhells always contain ſome portion of inflammable matter, which, being reduced to a coal by the action of the fire, furniſhes a quantity of phlogiſton, and imparts it to the whole of the calcareous matter.

Having thus ſeen that the phoſphori of which we now ſpeak are all compoſed of pure calcareous earth and phlogiſton, we are next to conſider, that the phlogiſton muſt be in ſuch a ſtate as it is when ſaturated with fire and ready to inflame. It is not indeed in the ſtate of vapour, becauſe this would require a quantity of fire detached from any other ſubſtance, and interpoſed between the particles of the vapour, in order to keep them at a diſtance, or to give it elaſticity. But the fire which ought to do this is confined by the calcareous earth, which alſo detains the phlogiſton itſelf. As long therefore as the balance is thus preſerved, the phoſphorus cannot ſhine; but as ſoon as a freſh quantity of light is diſcharged upon it, then more light or fire (for they are the very ſame in this caſe), enters the quicklime than it can contain. The conſequence of this is, that the quantity which cannot be retained by the earth, exerts its force upon the phlogiſton; which having already as much as it can hold, not only the ſuperfluous quantity is diſcharged, but alſo part of that which the phlogiſton had abſorbed before. The burning indeed is very ſlow and weak, becauſe the phlogiſton is obſtinately retained by the earth, which both impedes the ignition, and prevents the diſſipation of the phlogiſton in vapour. However, as ſoon as the lime has by its action impeded the farther extrication of the phlogiſton, the balance is reſtored, the fire goes out, and the phoſphorus ceaſes to be luminous. Heat will kindle it again; but thus a larger quantity of phlogiſtic

* See the article COLD, n° 4.

† See the article SULPHUR

phlogiſtic matter is diſſipated, and the phoſphorus is ſoon deſtroyed. Light does the ſame, but in a much more moderate degree; and therefore the phoſphorus may be frequently rekindled by means of light, and will continue its ſplendor for a long time. But if the light is too long continued, or too violent, it will produce the ſame conſequence whether it is attended with perceptible heat or not.

With regard to the phoſphorus of urine, the caſe is the ſame; only, inſtead of the calcareous earth, we have here an acid joined with phlogiſton. The latter is in exceeding ſmall quantity, and of conſequence ſo loaded with fire that the leaſt additional heat, rubbing, or alteration in the weather, forces more fire upon it than it can bear, and therefore part of it is continually flaſhing off in thoſe coruſcations formerly mentioned. The reaſon why this phoſphorus flaſhes like lightning, and the others give only a ſteady light like coals, is, that the compound is very volatile. It requires indeed a violent fire to diſtill it at firſt; but in the diſtillation ſo much fire is imbibed, that it ſeems ever afterwards ready to evaporate ſpontaneouſly; and therefore phoſphorus, when once made, is eaſily rediſtilled in cloſe veſſels.

It now remains only to ſhow the reaſon why the phoſphorus of urine and ſome others will ſhine under water, or in an exhauſted receiver, while rotten wood, &c. will not. This ſeems to ariſe from the quantity of fire which they have *internally*, and which requires no ſupply from the external air as in the caſe of common fire: and hence the phoſphorus of urine ſhines more briſkly *in vacuo* than in the air; becauſe the preſſure of the atmoſphere is then taken off, and the evaporation of the phlogiſtic matter promoted. The light of fiſhes and rotten wood ſeems to be of an electric nature; and therefore ceaſes when the air is exhauſted, as on this fluid all the phenomena of electricity are found to depend.

With regard to the various colours of phoſphoric light, ſome have imagined that the earthy ſubſtance was capable of imbibing a certain quantity of light, and emitting it afterwards in the very ſame ſtate, and having the ſame colour which it had before. But this is now known to be a miſtake, and the light of the phoſphori is found to be owing to a true accenſion, though weak, as in other burning bodies. Hence it is very probable that the colour of the light depends upon the degree of accenſion; for we ſee that even in common fires the colour depends in a great meaſure on the ſtrength of the flame. Thus the flame of a candle, where it is not well kindled at bottom, always appears blue. The flame of a ſmall quantity of ſulphur, or of ſpirit of wine, is blue; but if a large quantity of either of theſe ſubſtances be ſet on fire, the flame will in many places appear white. A ſtrong flame mixed with much ſmoke appears red. A weak one in ſimilar circumſtances appears brown, &c. Hence if the phoſphorus is weakly kindled, it will emit a brown, violet, blue, or green flame; if ſtrongly, a red or white one.

It has already been mentioned, that almoſt all terreſtrial bodies have a phoſphoric quality; however this, in moſt of them, is extremely weak, and continues only for a very ſhort time. Signor Beccaria, who diſcovered this property, in order to find out what ſubſtances were phoſphoric, and what were not, had a machine contrived like a dark lanthorn, in which he included himſelf, in order to perceive with the greater facility any ſmall quantity of light which might be emitted by the ſubſtances which he deſigned to examine. In the ſide of the machine was a cylinder capable of being turned about without admitting any light. Upon this were paſted the ſubſtances he deſigned to examine, and by turning the cylinder he immediately brought them from the light of the ſun into intenſe darkneſs; in which ſituation there were but few ſubſtances which did not afford a ſufficient quantity of light to render themſelves viſible. This phænomenon, however, is evidently ſimilar to an optical illuſion by which we are made to ſee what is not preſent before us; for if we look very intenſely upon any thing for ſome time, ſuffering no more light to enter our eyes than what is reflected from that object, we will imagine that we ſtill ſee it, though we remove into the dark or ſhut our eyes. The reaſon of this is, that the nervous fluid being once put in motion after a certain manner, continues that motion for a ſhort ſpace of time after the moving cauſe is removed. In like manner, as the light is partly reflected from bodies, and partly penetrates them, when any body is expoſed to the light, and then is ſuddenly brought into a dark place, the etherial fluid within its ſubſtance being once put into motion does not ceaſe to move immediately, but for a time produces that vibration which we call *light;* for the ſubſtance of light is preſent in the moſt intenſe darkneſs as well as in ſunſhine. Hence almoſt all ſubſtances are capable of emitting light in the dark, after being expoſed to a vigorous ſunſhine; though the reaſon of their doing ſo may be very different from that by which the phoſphori become luminous.

Many entertaining experiments may be made with the various kinds of phoſphori, eſpecially with that of urine. This laſt, however, is ſometimes dangerous on account of the violence with which it burns. If diſſolved in oil of cloves, it loſes this property, but continues to be as luminous as before; ſo that this mixture, called *liquid phoſphorus*, may be uſed with ſafety. As on ſome occaſions it may be wiſhed to have it in powder, it is proper to obſerve that this may be done with ſafety by pouring ſome hot water upon the phoſphorus in a glaſs mortar. The compound melts, and while in a ſoft ſtate is eaſily reducible to powder of any degree of fineneſs.

Acid of PHOSPHORUS. This acid, called alſo the *microcoſmic* acid, has already been deſcribed, and the method of procuring it from urine ſhown, under the article CHEMISTRY, n° 307, 308. Since that article was written, however, it has been diſcovered by Mr Schele, that an acid capable of making phoſphorus is producible from calcined bones or hartſhorn, and the vitriolic acid. The proceſs for procuring this acid recommended by that gentleman was to diſſolve the bones in nitrous acid; afterwards to precipitate the earth by means of the vitriolic acid; to filter and evaporate the liquor to dryneſs; and, after driving off the nitrous acid, the phoſphoric acid remains. This proceſs, however, is expenſive on account of the waſte of nitrous acid; and is likewiſe very inconvenient, becauſe a great deal of the earthy matter continues diſſolved, even after the vitriolic acid is poured in, and therefore the phoſphoric acid is never to be obtained pure; for which reaſon, the following proceſs is preferable.

Take of calcined bones or hartſhorn, one pound; oil of vitriol, 14 ounces. Let the bones be reduced to fine powder; then pour on the acid undiluted, and rub both together till they are as accurately mixed as poſſible. Having let them remain for ſome hours in this ſituation, pour on as much water, ſtirring and diſſolving the lumps into which the maſs will now be concreted, till it is all equally diſtributed through the liquid, and has the conſiſtence of thick gruel. Let it remain 24 hours, and then pour it into a canvas cloth in order to let the liquid drain from it. This is a very tedious operation, as freſh water muſt continually be pouring on till all the ſaline matter is waſhed off. When this is done, pour into the liquid a quantity of cauſtic volatile alkali, which will occaſion a copious precipitation; for the earth of bones is much leſs ſtrongly attracted by acids than even the cauſtic volatile alkali. The liquid being now filtered a ſecond time, which will be done with ſufficient eaſe, and afterwards evaporated, there remains a maſs compoſed of phoſphoric acid, and vitriolic ſal ammoniac. By increaſing the fire, the latter is diſſipated in vapour; and if the proceſs has been ſucceſsful, four ounces or more of pure phoſphoric acid will remain.

With regard to the properties of this acid, it is not yet aſcertained whether they are exactly the ſame with the microcoſmic acid or not. Indeed, as far as yet appears, they ſeem to be different; and there are very ſtrong reaſons for ſuppoſing that the phoſphoric acid thus produced is no other than the vitriolic altered by its combination with the earth of bones. See the article Bones in the APPENDIX.

PHOTIUS, patriarch of Conſtantinople, was one of the fineſt geniuſes of his time, and his merit raiſed him to the patriarchate; for Bardas having driven Ignatius from the ſee, Photius was conſecrated by Aſbeſtus in 859. He condemned Ignatius in a ſynod, whereupon the pope excommunicated him, and he, to balance the account, anathematized the pope. Baſilius of Macedon, the emperor whom Photius had reproved for the murder of Michael the late emperor, expelled him, and reſtored Ignatius; but afterward re-eſtabliſhed Photius, upon Ignatius's death, in 878. At laſt, being wrongfully accuſed of a conſpiracy againſt the perſon of Leo the philoſopher, ſon and ſucceſſor to Baſilius, he was expelled by him in 886, and is ſuppoſed to have died ſoon after. He wrote a Bibliotheca, which contains an examen of 280 authors: we have alſo 253 epiſtles of his; the Nomocanon under 14 titles; an abridgment of the acts of ſeveral councils, &c. He was a perſon of prodigious reading, and the greateſt ſcholar almoſt of any age,

PHRASE, in gramar, an elegant turn or manner of ſpeech, peculiarly belonging to this or that occaſion, this or that art, or this or that language. Thus we ſay, an Italian *phraſe*, an eaſtern *phraſe*, a poetical *phraſe*, a rhetorical *phraſe*.

Phrase is ſometimes alſo uſed for a ſhort ſentence, or ſmall ſet or circuit of words conſtructed together. In this ſenſe, Father Buffier divides phraſes into complete and incomplete.

Phrares are *complete* where there is a noun and a verb, each in its proper function; *i. e.* where the noun expreſſes a ſubject, and the verb the thing affirmed of it.

Incomplete Phrases are thoſe where the noun and the verb together only do the office of a noun; conſiſting of ſeveral words without affirming any thing, and which might be expreſſed in a ſingle word. Thus, *that which is true*, is an incomplete phraſe, which might be expreſſed in one word, *truth*; as "that which is true ſatisfies the mind," *i. e.* "truth ſatisfies the mind."

PHRASEOLOGY, a collection of the phraſes, or elegant expreſſions, in any language. See Phrase.

PHRENITIS, the ſame with Phrensy; an inflammation of the meninges of the brain, attended with an acute fever and delirium. See Medicine, n° 284.

PHRYGIA, an extenſive country of the Hither Aſia, on this ſide mount Taurus, and the river Halys. Reckoned by the ancients twofold, viz. the *Greater* and *Leſs*, (Livy, Ptolemy.) The Leſs Phrygia ſeems to have conſiſted of two parts; one nearer the Helleſpont, from which it is called *Helleſpontiaca*: the other, which was to the ſouth of Bithynia, about Olympus, more remote from the Helleſpont, and under the dominion of Pruſias; but which was afterwards ceded to the Attali, or to Eumenes, by them called *Epictetos*; which in a laxer ſenſe denotes the Minor Phrygia, or the Leſs; but in a ſtricter, is diſtinct from the Phrygia on the Helleſpont, and lies at the foot of Olympus, a mountain of Myſia, on the confines of Bithynia: ſo that we have three Phrygias; Major, Minor, and Epictetos.

PHTHIRIASIS, the lousy evil, from φθειρ, "a louſe." It is a louſy diſtemper; children are frequently its ſubjects, and adults are ſometimes troubled with it. The increaſe of lice, when in a warm moiſt ſituation, is very great; but a cold and dry one ſoon deſtroys them. On the human body four kinds of lice are diſtinguiſhed: 1. The *pediculi*, ſo called becauſe they are more troubleſome with their feet than by their bite. Theſe are in the heads of children, eſpecially if ſore or ſcabby; and often in thoſe of adults, if they are ſlothful and naſty. 2. Crab-lice, ſee *Crab*-Lice.. 3. Body lice; theſe infeſt the body, and breed in the clothes of the naſty and ſlothful. 4. A ſort which breed under the cuticle, and are found in the hands and feet: they are of a round form, and ſo minute as often to eſcape the ſight: by creeping under the ſcarfſkin they cauſe an intolerable itching; and when the ſkin burſts where they lodge, cluſters of them are found there. See Acarus.

A good diet and cleanlineſs conduce much to the deſtruction of lice. When they are in the head, comb it every day; and, after each combing, ſprinkle the pulv. ſem. ſtaph. agr. or coccul. Ind. among the hairs every night, and confine it with a tight cap.

Codrochius, in his treatiſe on lice, ſays, that the powdered coc. Ind. exceeds all other means; and that it may be mixed in the pulp of apple, or in lard, and applied every night to the hair. Some writers aſſert, that if the pul. cort. rad. ſaſſafr. is ſprinkled on the head, and confined with a handkerchief, it deſtroys the lice in one night.

The body-lice are deſtroyed by any bitter, ſour, ſalt, or mercurial medicine, if applied to the ſkin.

The black ſoap, and the flowers called *cardamine*, or *lady's-ſmock*, are ſaid to be ſpecifics in all caſes of lice on the human body.

PHTHISIS, a ſpecies of conſumption, occaſioned by an ulcer in the lungs. See MEDICINE, n° 351—353. and p. 4870, 4871.

PHUL, or PUL, king of Aſſyria, by ſome hiſtorians ſaid to be Ninus under another name, and the firſt founder of that monarchy: A renowned warrior. He invaded Iſrael in the reign of Manahem, who became tributary to him, and paid him 1000 talents of ſilver for a peace. Flouriſhed 771 B. C.

PHYLACTERY, in the general, was a name given by the ancients to all kinds of charms, ſpells, or characters, which they wore about them, as amulets, to preſerve them from dangers or diſeaſes.

PHYLACTERY particularly denoted a ſlip of parchment, wherein was wrote ſome text of holy ſcripture, particularly of the decalogue, which the more devout people among the Jews wore on the forehead, the breaſt, or the neck, as a mark of their religion.

The primitive Chriſtians alſo gave the name *phylacteries* to the caſes wherein they incloſed the relics of their dead.

PHYLICA, BASTARD ALATERNUS; a genus of the monogynia order, belonging to the pentandria claſs of plants. There are ſix ſpecies, of which three are kept in the gardens of this country; but, by reaſon of their being natives of warm climates, they require to be kept in pots, and houſed in winter. They are all ſhrubby plants, riſing from three to five or ſix feet high; and adorned with beautiful cluſters of white flowers. They are propagated by cuttings.

PHYLLANTHUS, SEA-SIDE LAUREL; a genus of the triandria order, belonging to the monoecia claſs of plants. There are ſix ſpecies, all of them natives of warm climates; and riſe from 12 or 14 feet, to the height of middling trees. They are tender, and cannot be propagated in this country without artificial heat.

PHYSALIS, the WINTER CHERRY; a genus of the monogynia order, belonging to the pentandria claſs of plants. There are 16 ſpecies; of which the moſt remarkable is the alkekengi, or common winter-cherry. This grows naturally in Spain and Italy. The roots are perennial, and creep in the ground to a great diſtance if they are not confined. Theſe, in the ſpring, ſhoot up many ſtalks, which riſe to the height of a foot or more, garniſhed with leaves of various ſorts; ſome of which are angular and obtuſe, ſome oblong and ſharp pointed, with long foot-ſtalks. The flowers are produced from the wings, ſtanding upon ſlender foot-ſtalks; are of a white colour, and have but one petal. They are ſucceeded by round berries about the ſize of ſmall cherries, incloſed in an inflated bladder, which turns red in autumn, when the top opens and diſcloſes the red berry, which is ſoft, pulpy, and filled with flat kidney-ſhaped ſeeds. Soon after the fruit is ripe, the ſtalks decay to the root. The plant is eaſily propagated, either by ſeeds, or parting the roots.

PHYSETER, or SPERMACETI-FISH, in zoology, a genus belonging to the order of cete. There are four ſpecies; the moſt remarkable are,

1. The microps, or black-headed cachalot, with a long fin on the back, and the upper jaw conſiderably longer than the under one. A fiſh of this kind was caſt aſhore on Cramond iſle, near Edinburgh, December 22d, 1769; its length was 54 feet; the greateſt circumference, which was juſt beyond the eyes, 30: the upper jaw was five feet longer than the lower, whoſe length was ten feet. The head was of a moſt enormous ſize, very thick, and above one-third the ſize of the fiſh: the end of the upper jaw was quite blunt, and near nine feet high: the ſpout hole was placed near the end of it. The teeth were placed in the lower jaw, 23 on each ſide, all pointing outwards; in the upper jaw, oppoſite to them, were an equal number of cavities, in which the ends of the teeth lodged when the mouth was cloſed. One of the teeth meaſured eight inches long, the greateſt circumference the ſame. It is hollow within ſide for the depth of three inches, and the mouth of the cavity very wide: it is thickeſt at the bottom, and grows very ſmall at the point, bending very much; but in ſome the flexure is more than in others. Theſe, as well as the teeth of all other whales we have obſerved, are very hard, and cut like ivory. The eyes are very ſmall, and remote from the noſe. The pectoral fins placed near the corners of the mouth, and were only three feet long: it had no other fin, only a large protuberance on the middle of the back. The tail was a little forked, and 14 feet from tip to tip. The penis ſeven feet and a half long. Linnæus informs us, that this ſpecies purſues and terrifies the porpeſſes to ſuch a degree as often to drive them on ſhore.

2. The catodon, or round-headed cachalot, with a fiſtula in the ſnout, and having no back fin. Of this ſpecies, a hundred and two of different ſizes were caſt aſhore at one time, on one of the Orkney Iſles, the largeſt 24 feet in length. The head is round, the opening of the mouth ſmall: Sibbald ſays it has no ſpout-hole, but only noſtrils. But Mr Pennant is of opinion, that the former being placed at the extremity of the noſe has been miſtaken by him for the latter. Some teeth of this ſpecies are an inch and three quarters long, and in the largeſt part, of the thickneſs of one's thumb. The top is quite flat, and marked with concentric lines; the bottom is more ſlender than the top, and pierced with a ſmall orifice; inſtead of a back fin there was a rough ſpace.

For the method of extracting the ſpermaceti from the brain of theſe creatures, ſee the article SPERMACETI.

PHYSIC, or PHYSICK, the art of healing; properly called MEDICINE. The word is formed from the Greek φυσις, "nature;" in regard medicine conſiſts principally in the obſervation of nature. See PHYSICS and MEDICINE.

PHYSICAL, ſomething belonging to, or really exiſting, in nature. In this ſenſe we ſay a phyſical point, in oppoſition to a mathematical one, which only exiſts in the imagination; a phyſical ſubſtance or body, in oppoſition to ſpirit, or metaphyſical ſubſtance, &c.

PHYSICIAN, a perſon who profeſſes medicine, or the art of healing diſeaſes. See MEDICINE.

PHYSICS, or NATURAL PHILOSOPHY. By the word *phyſics*, in its moſt extenſive ſenſe, we underſtand *The ſcience of the operations of nature, and of its productions.* This definition is alone ſufficient to inform us, what are

Phyſics.

the particular parts of phyſics, and what are the means it employs to attain its ends. Thus NATURAL *Hiſtory*, or ZOOLOGY, BOTANY, and MINERALOGY, deſcribe thoſe bodies that nature produces, as far as they are diſcernible by our ſenſes. So CHEMISTRY and EXPERIMENTAL *Philoſophy* diſcover to us, at leaſt in part, the compoſition of bodies, and the various alterations of which thoſe compoſitions are ſuſceptible. So *General* and *Speculative* PHYSICS draws from all theſe preliminary obſervations, from all theſe matters of fact, juſt conſequences relative to the univerſal laws of nature, to the properties, forces, action, and eſſential qualities of bodies.

The object of phyſics being the examination of the whole frame of nature, ſo far as it is viſible and palpable to man, it is eaſily to conceive, that it muſt form the moſt extenſive branch of human knowledge, ſeeing that the operations of nature are varied almoſt to infinity. To reduce this immenſe ſubject into ſome order, philoſophers have begun by dividing all the productions of this globe into three claſſes, which they call *kingdoms*, and diſtinguiſh into the *vegetable*, the *mineral*, and *animal kingdom*. Botany, mineralogy, and natural hiſtory properly ſo called, teach therefore all that is come to the knowledge of man in each of theſe kingdoms. Chemiſtry reſolves all bodies, and conſequently ſhows the manner in which they are compounded. Philoſophers have likewiſe diſcovered that the univerſe is compoſed of elements, of which there are four, EARTH, WATER, FIRE, and AIR. Experimental philoſophy, by numberleſs eſſays and obſervations, explains the manner in which theſe elements operate upon each other, and the effects that they produce. The knowledge of thoſe heavenly bodies, whoſe various courſes fill the vaſt expanſe of the firmament, and of their properties and courſes either real or apparent, is compriſed in the ſcience of ASTRONOMY.

All the ancient oriental nations, including the Hebrews and the Egyptians, were mere novices in phyſics; and their ignorance ſeems to prove the infancy of the world. The Greeks, men of a ſubtile and inquiſitive genius, went further, and ſometimes gueſſed right enough, though very rarely. Empedocles, for example, who is ranked by ſome among the Pythagoreans, profeſſed the ſyſtem of the four elements in nature; and added thereto two principles, which he called *principium amicitiæ*, and *principium contentionis*. The firſt, according to him, is the cauſe of the coalition of beings; and the ſecond, that of their receſſion or ſeparation. Was not this derived from the ſame origin as the celebrated ſyſtem of the attraction and repulſion of bodies? Whatever was the cauſe, the progreſs of phyſics has ever been ſlow; and we are aſtoniſhed when we ſee ancient writers of the greateſt genius, as Plutarch and an hundred others, make uſe of ſuch wretched reaſoning when they mention thoſe ſubjects that relate to phyſics.

Among the Romans, Lucretius and Cicero have indeed written on theſe ſubjects; but they have only related the opinions of the Greeks, which were not worthy of great regard. Seneca and Pliny went further; and we are obliged to the latter for the uſeful obſervations which he has made on many parts of this ſcience, although he is frequently too credulous. Pliny, moreover, does not belong to the claſs of dogmatic authors on phyſics, as he gives only an hiſtorical account of theſe matters.

The firſt ages of Chriſtianity were the ages of darkneſs for all the ſciences and the arts. It was not till very late, that Bacon baron of Verulam, and ſome of his cotemporaries, produced the firſt ſparks of thoſe fair lights that have ſince blazed forth by the happy labours of their ſucceſſors. Gaſſendus, Deſcartes, Rudiger, Newton, Leibnitz, Wolff, and a multitude of other celebrated philoſophers, have diffuſed theſe lights over philoſophy; and all theſe great men have at laſt eſtabliſhed that method of treating it which is alone able to diſcover the truth. This method is perfectly ſimple. They begin with eſtabliſhing facts by means of experiments and obſervations, and draw from thence conſequences relative to their cauſes and principles. For, as ſoon as experience or the ſenſes have diſcovered what paſſes in nature, the mind endeavours to diſcover what cannot be diſtinguiſhed by the ſenſes; that is to ſay, what may be the cauſe or the end of each phenomenon or operation in nature; and by this means it conſtantly combines the accuracy of obſervation with the ſagacity and rigour of argument.

It is certain, that a diligent obſervation of the ſubjects of MINERALOGY and ZOOLOGY, united with the ſtudy of BOTANY, affords every poſſible information relative to natural hiſtory in general; that is, we thereby acquire the hiſtorical knowledge of all the beings of this globe, that nature produces. EXPERIMENTAL *Philoſophy*, aided by CHEMISTRY, and ſeveral parts of the MATHEMATICS, diſcloſe the compoſition of theſe beings, and the ſprings by which nature operates in their production, and in making them produce, in their turn, the mutual effects of the elements, &c. ASTRONOMY, of which we have in like manner treated, explains the nature of the celeſtial bodies and their courſes: and all theſe various ſciences, united, conduct us at laſt, as far as the human mind is able to proceed, to the determination of the general laws of nature in the order of the univerſe; from whence reſult *univerſal* and *ſpeculative Phyſics*, of which it remains to give a curſory idea. This ſcience, which for ſome thouſand years has been juſtly called *ſpeculative*, ſeeing that it has been founded altogether on vain ſpeculations, and ſuppoſitions merely ideal, is at length ſupported by experiments and obſervations that bear the ſtamp of manifeſt demonſtrations. It now forms no ſyſtem, admits of no hypotheſis, but ſuch whoſe veracity and certainty have been previouſly demonſtrated. For which purpoſe it calls to its aſſiſtance all the ſubordinate ſciences, and makes uſe of their operations in the inveſtigation and eſtabliſhment of its principles. As MINERALOGY, BOTANY, ZOOLOGY, CHEMISTRY, ANATOMY, PHYSIOLOGY, and almoſt all the other parts of PHYSIC, GEOGRAPHY, EXPERIMENTAL *Philoſophy*, all the particular ſciences which are compriſed under the general denomination of MATHEMATICS; all theſe have relation to general phyſics, and each of them concurs more or leſs to furniſh materials for its ſublime operations. When, by the aſſiſtance of the labours of theſe, phyſics has eſtabliſhed the veracity of facts, it then applies the moſt ſubtile, abſtract, and profound ratiocination, to draw from thence juſt conſequences, and to eſtabliſh general principles, founded on theſe facts, relative to the univerſal laws of nature;

to the celeſtial bodies, and the true order of the univerſe; to the elements, and their reciprocal action; to meteors; to bodies that are both viſible and tangible; to the reciprocal action of palpable bodies; to the generation of beings in general, and of man in particular; to every production of nature in all the three kingdoms: in a word, it endeavours to account, as far as the weak lights of the human underſtanding are capable of accounting, for all the phenomena of heaven and earth. See all the abovementioned ſciences ſeverally treated in the order of the alphabet.

PHYSIOGNOMONICS, among phyſicians, denote ſuch ſigns as, being taken from the countenance, ſerve to indicate the ſtate, diſpoſition, &c. both of the body and mind: and hence the art of reducing theſe ſigns to practice is termed *phyſiognomy*.

PHYSIOGNOMY, the art of knowing the humour, temperament, or diſpoſition of a perſon, from obſervation of the lines of his face, and the characters of its members or features. The word is formed from the Greek φυσις, "nature," and γινωσκω, "I know."

Baptiſta Porta and Robert Fludd are the principal modern authors on phyſiognomy. The ancient ones are the ſophiſt Adamantius, and Ariſtotle; the phyſiognomy of which laſt we have tranſlated into Latin by De Lacuna.

There ſeems to be ſomething in phyſiognomy, and it may perhaps bear a much purer philoſophy than what theſe authors were acquainted withal. This, at leaſt, we dare ſay, that of all the fanciful arts of the ancients, diffuſed among the moderns, there is none has ſo much foundation in nature as this.

There is an apparent correſpondence between the face and the mind. The features and lineaments of the one are directed by the motions and affections of the other. there is even a peculiar arrangement of the members of the face, a peculiar diſpoſition of the countenance, to each particular affection, perhaps to each particular idea of the mind. In effect, the language of the face, *phyſiognomy*, is as copious, nay, perhaps as diſtinct and intelligible, as that of the tongue.

The foundation of phyſiognomy is this: The different objects that preſent themſelves to the ſenſes, nay, the different ideas that ariſe in the mind, do each make ſome impreſſion on the ſpirits; and each an impreſſion correſpondent or adequate to its cauſe; therefore each a different impreſſion.

Now, if by repeated acts, or the frequent entertaining of a favourite paſſion, or vice, which natural temperament has hurried or cuſtom dragged one to, the face is often put in that poſture which attends ſuch acts; the animal-ſpirits will make ſuch patent paſſages through the nerves (in which the eſſence of a habit conſiſts), that the face is ſometimes unalterably ſet in that poſture, or at leaſt falls inſenſibly and mechanically into that poſture, unleſs ſome preſent object diſtort it therefrom, or diſſimulation hide it.

This reaſoning is confirmed by obſervation. Thus we ſee great drinkers with eyes generally ſet to the noſe; the adducent muſcles being often employed to put them in that poſture, in order to view their loved liquor in the glaſs in the time of drinking; whence thoſe muſcles are alſo denominated *bibitory muſcles*. Thus alſo laſcivious perſons are remarkable for the *oculorum mobilis petulantia*, as Petronius calls it.—Hence we may account for the Quakers expecting face waiting the ſpirit, the melancholy face of moſt ſectaries, the ſtudious face of men of great application of mind, &c.

Were our obſervation a little more ſtrict and delicate, we might doubtleſs not only diſtinguiſh habits and tempers, but even profeſſions.—In effect, does there need much penetration to diſtinguiſh the fierce look of the veteran ſoldier, the contentious look of the practiſed pleader, the ſolemn look of the miniſter of ſtate, &c.

Within theſe few years, one M. Lavater of Zurich has attempted to revive the trade of phyſiognomy, and publiſhed a quarto volume on the certainty and utility of the art. His reaſons for believing in it, beſides thoſe already given, are to the following purpoſe. "Every moment we are acting upon phyſiognomical principles, without being aware of it; and not men only, but the brutes alſo, even inſects, both know their moſt convenient food, and their enemies, by the outſide. What are we doing when we chooſe out ſome fruits as the beſt, or when we prefer one horſe to another, but judging, from the outſide, of the internal qualities? We then certainly act the phyſiognomer. That every man is undoubtedly a natural phyſiognomer, is ſtill more apparent from conſidering the effects which reſult from the firſt ſight of perſons unknown. We are often much inclined to tell our friends, that we do not like the man before us, altho' we be in no degree acquainted with him. Whoever is an attentive obſerver of what paſſes in his own mind, knows that he no ſooner ſees any perſon, than certain attendant ideas ſucceed the firſt impreſſion, which involve nothing leſs than a judgment over his diſpoſitions of mind, ſo far that we pronounce him to be of a quite different caſt from ſome others of our acquaintance. We cannot, in every caſe, tell exactly why we judge thus, whether it be from his figure, from his eyes, or from his noſe. Nor can we always determine, whether the impreſſion be not from different ideas complicated. This is not to be learned by rule; we judge only from a feeling acquired by experience. As phyſiognomical practice is general, it cannot be but founded in nature; and one ſhould think, therefore, that it poſſibly might be the ſubject of ſcience. Does not practice always precede theoretical knowledge?"

The rules for this extraordinary art are not laid down in the volume we now ſpeak of; however, ſo many things are neceſſary on the part of the artiſt, that no body, it would ſeem, without a tolerable ſhare of ſelf-ſufficiency, could engage in the art. The reaſon is, that it requires virtue in the artiſt to perceive virtue in the face of him whom he inſpects; and conſequently, unleſs the phyſiognomiſt is poſſeſſed of all the virtues in the world, he will be perpetually drawing falſe concluſions; for, "No one, (ſays our author,) certainly is able to diſcern the look of magnanimity, or the countenance of an exalted ſoul, but he who is magnanimous himſelf, who thinks nobly, and who is diſpoſed to act generouſly."

PHYSIOLOGY, properly denotes a diſcourſe of nature, and natural bodies; or, it is that part of natural philoſophy which treats of the various phenomena of nature in a ſcientifical and ſpeculative way. See PHYSIOLOGY.

Among phyſicians, the term *phyſiology* denotes the hiſtory of the human body, and its ſeveral conſtituent parts, with their relations and functions. See ANATOMY.

PHYTOLOGY, a diſcourſe concerning the kinds and virtues of plants. See BOTANY, and MATERIA *Medica*.

PIAZZA, in building, popularly called *piache*, an Italian name for a portico, or covered walk, ſupported by arches.

The word literally ſignifies a broad open place or ſquare; whence it alſo became applied to the walks or portico's around them.

PICA, in ornithology. See CORVUS.

PICA, in medicine, a depravation of appetite, which makes the patient long for what is unfit for food, or incapable of nouriſhing; as chalk, aſhes, coals, plaſter-lime, &c. See MEDICINE, n° 465.

PICARD, a native of the Netherlands, who improved upon the errors of the Adamites. He called himſelf the Son of God; and pretended, that, like a new Adam, he was ſent by his father to reſtore the law of nature, which, according to him, chiefly conſiſted in community with reſpect to women, and in going quite naked. It is ſaid, that though marriage was inſtituted among them, no man was allowed to lie with a woman without firſt obtaining leave of the chief of the ſect. He fortified himſelf in an iſland in the river Liſmik, ſeven leagues from Thabor, the military reſidence of the famous Ziſca; but unhappily for him, 40 of his followers being gone out upon a party, baſely plundered ſome country houſes, and killed upwards of 200 perſons; upon which Ziſca attacked the iſland, took it, and put all the Picards to the ſword, except two, whoſe lives he ſpared in order to learn from their own mouths the principles of their religion. This happened in the year 1420.

PICARD (John), an able mathematician, and one of the moſt learned aſtronomers of the 17th century, was borne at Fleche, and became prieſt and prior of Rillie in Anjou. Going to Paris, he was in 1666 received into the Academy of Sciences, in quality of aſtronomer. In 1671, he was ſent, by order of the king, to the caſtle of Uraniburg, built by Tycho Brahe in Denmark, to make aſtronomical obſervations there; and from thence he brought the original manuſcripts wrote by Tycho Brahe, which are the more valuable as they differ in many places from the printed copies, and contain a book more than has yet appeared. He made important diſcoveries in aſtronomy; and was the firſt who travelled through ſeveral parts of France, to meaſure a degree of the meridian. His works are, 1. A treatiſe on levelling. 2. Fragments of dioptrics. 3. *Experimenta circa aquas effluentes*. 4. *De menſuris*. 5. *De menſura liquidorum & aridorum*. 6. A voyage to Uraniburg, or aſtronomical obſervations made in Denmark. 7. Aſtronomical obſervations made in ſeveral parts of France, &c. Theſe, and ſome other of his works, which are much eſteemed, are in the ſixth and ſeventh volumes of the Memoirs of the Academy of Sciences.

PICARDY, a province of France, bounded on the north by Hainault, Artois, and the ſea; on the eaſt, by Champagne; on the ſouth, by the iſle of France; and on the weſt, by Normandy and the Britiſh channel. It is divided into the Upper, Middle, and Lower Picardy; and the principal rivers are the Somme, the Oyſe, the Canche, the Lis, the Scarp, the Deule, and the Aa. The ſoil is very fertile in corn, fruits, and paſtures; but it produces no wine. They have a conſiderable trade in woollen manufactures, and the inhabitants are a very induſtrious people. Amiens is the capital town.

PICART (Bernard), a celebrated engraver, ſon of Stephen Picart, alſo a famous engraver, was born at Paris in 1673. He learned the elements of his art from his father, and ſtudied architecture and perſpective under Sebaſtian le Clerc. As he embraced the reformed religion, he ſettled in Holland to enjoy the free exerciſe of it; where his genius produced thoſe maſterpieces which made him eſteemed the moſt ingenious artiſt of his age: and a multitude of books are embelliſhed with plates of his engraving. He died in 1733.

PICENTIA, (Strabo, Pliny); the capital of the Picentini, whoſe territory, called *Ager Picentinus*, a ſmall diſtrict, lay on the Tuſcan ſea, from the *Promontorium Minervæ*, the ſouth boundary of Campania on the coaſt, to the river Silarus, the north boundary of Lucania, extending within-land as far as the Samnites and Hirpini, though the exact termination cannot be aſſigned. The Greeks commonly confound the *Picentini* and *Picentes*, but the Romans carefully diſtinguiſh them. The former, with no more than two towns that can be named, *Silernum* and *Picentia*; the ſituation of both doubtful: only Pliny ſays the latter ſtood within-land, at ſome diſtance from the ſea. Now thought to be *Bicenza*, (Holſtenius), in the Principato Citra of Naples.

PICENUM, (Cæſar, Pliny, Florus); PICENUS AGER, (Cicero, Salluſt, Livy, Tacitus); *Ager Picentium*, (Varro): a territory of Italy, lying to the eaſt of Umbria, from the Apennine to the Adriatic; on the coaſt extending from the river Aeſis on the north, as far as the *Prætutiani* to the ſouth. In the upper or northern part of their territory the Umbri excluded them from the Apennine, as far as Camerinum, (Strabo); but in the lower or ſouthern part they extended from the Adriatic to the Apennine. A very fruitful territory, and very populous. *Picentes*, the people, (Cicero); from the ſingular, *Picens*, (Livy): different from the *Picentini*, on the Tuſcan ſea, tho' called ſo by the Greeks; but Ptolemy calls them *Piceni*, as does alſo Pliny. Their territory at this day is ſuppoſed to form the greateſt part of the March of Ancona, (Cluverius.)

PICKERY, in Scots law, petty theft, or ſtealing things of ſmall value.

PICKETS, in fortification, ſtakes ſharp at one end, and ſometimes ſhod with iron, uſed in laying out the ground, of about three feet long; but, when uſed for pinning the faſcines of a battery, they are from three to five feet long.

PICKETS, in artillery, are about five or ſix feet long, ſhod with iron, to pin the park lines, in laying out the boundaries of the park.

PICKETS, in the camp, are alſo ſtakes of about ſix or eight inches long, to faſten the tent cords, in pitching the tents; alſo, of about four or five feet long, driven

Picket | Piquet.

ven into the ground near the tents of the horſemen, to tie their horſes to.

Picket, an out-guard poſted before an army, to give notice of an enemy approaching.

Picket, a kind of puniſhment ſo called, where a ſoldier ſtands with one foot upon a ſharp-pointed ſtake: the time of his ſtanding is limited according to the offence.

PICQUERING, a flying war, or ſkirmiſh, made by ſoldiers detached from two armies for pillage, or before a main battle begins.

PIQUET, or Picket, a celebrated game at cards, much in uſe throughout the polite world.

It is played between two perſons, with only 32 cards; all the duces, threes, fours, fives, and ſixes, being ſet aſide.

In reckoning at this game, every card goes for the number it bears, as a ten for ten; only all court-cards go for ten, and the ace for eleven: and the uſual game is one hundred up.—In playing, the ace wins the king, the king the queen, and ſo down.

Twelve cards are dealt round, uſually by two and two; which done, the remainder are laid in the middle: if one of the gameſters finds he has not a court-card in his hand, he is to declare he has *carte blanche*, and tell how many cards he will lay out, and deſire the other to diſcard, that he may ſhew his game, and ſatisfy his antagoniſt that the carte-blanche is real; for which he reckons ten.

Each perſon diſcards, *i. e.* lays aſide a certain number of his cards, and takes in a like number from the ſtock.—The firſt, of the eight cards, may take three, four, or five; the dealer all the remainder, if he pleaſes.

After diſcarding, the eldeſt hand examines what ſuit he has moſt cards of; and reckoning how many points he has in that ſuit, if the other have not ſo many in that or any other ſuit, he tells one for every ten of that ſuit.—He who thus reckons moſt is ſaid to win the point.

The point being over, each examines what *ſequences* he has of the ſame ſuit, *viz.* how many tierces, or ſequences of three, quartes or fours, quintes or fives, ſixiemes or ſix's, &c. For a tierce they reckon three points, for a quarte four, for a quinte 15, for a ſixieme 16, &c. And the ſeveral ſequences are diſtinguiſhed in dignity by the cards they begin from: thus ace, king, and queen, are called *tierce major;* king, queen, and knave, *tierce to a king;* knave, ten, and nine, *tierce to a knave, &c.* and the beſt tierce, quarte, or quinte, *i. e.* that which takes its deſcent from the beſt card, prevails, ſo as to make all the others in that hand good, and deſtroy all thoſe in the other hand.—In like manner, a quarte in one hand ſets aſide a tierce in the other.

The ſequences over, they proceed to examine how many aces, kings, queens, knaves, and tens, each holds; reckoning for every three of any ſort, three: but here too, as in ſequences, he that with the ſame number of threes, has one that is higher than any the other has, *e. gr.* three aces, has all his others made good hereby, and his adverſary's all ſet aſide.—But four of any ſort, which is called a *quatorze*, always ſets aſide three.

All the game in hand being thus reckoned, the eldeſt proceeds to play, reckoning one for every card he plays above a nine, and the other follows him in the ſuit; and the higheſt card of the ſuit wins the trick.—Note, unleſs a trick be won with a card above a nine (except the laſt trick), nothing is reckoned for it; though the trick ſerves afterwards towards winning the cards; and that he who plays laſt does not reckon for his cards, unleſs he wins the trick.

The cards being played out, he that has moſt tricks reckons ten for winning the cards.—If they have tricks alike, neither reckons any thing.—The deal being finiſhed, and each having marked up his game, they proceed to deal again as before, cutting afreſh each time for the deal.

If both parties be within a few points of being up, the carte blanche is the firſt thing that reckons, then the point, then the ſequences, then the quatorzes or threes, then the tenth cards.

He that can reckon 30 in hand by carte blanche, points, quintes, &c. without playing, ere the other has reckoned any thing, reckons 90 for them; and this is called a *repique.*—If he reckons above 30, he reckons ſo many above 90. If he can make up 30, part in hand and part play, ere the other has told any thing, he reckons for them 60. And this is called a *pique.* Whence the name of the game.—He that wins all the tricks, inſtead of ten, which is his right for winning the cards, reckons 40. And this is called a *capot.*

Picris || Picts.

PICRIS, Ox-tongue; a genus of the polygamia æqualis order, belonging to the ſyngeneſia claſs of plants. There are four ſpecies, of which the only remarkable one is the echioides, or common ox-tongue, growing ſpontaneouſly in corn-fields in Britain. It has undivided leaves embracing the ſtem, with yellow bloſſoms, which ſometimes cloſe ſoon after noon, at other times remain open till nine at night. It is an agreeable pot-herb while young. The juice is milky, but not too acrid.

PICKLE, a brine or liquor, commonly compoſed of ſalt, vinegar, &c. ſometimes with the addition of ſpices, wherein meat, fruit, and other things are preſerved and ſeaſoned.

Name.

PICTS, the name of one of thoſe nations who anciently poſſeſſed the north of Britain. It is generally believed that they were ſo called from their cuſtom of painting their bodies. But as this cuſtom prevailed among the other ancient inhabitants of Britain, who uſed the *glaſtum* of Pliny and the *vitrum* of Mela for the like purpoſe, it may be aſked, Why the name of *Picti* was confined by the Romans to only one tribe, when it was equally applicable to many others? Why ſhould they deſign them only by an epithet without ever annexing their proper name? Or why ſhould they impoſe a new name on this people only, when they give their proper name to every other tribe which they have occaſion to ſpeak of? As theſe queſtions cannot be anſwered in any ſatisfactory manner, it is plain we muſt look for ſome other derivation of the name.

The Highlanders of Scotland, who ſpeak the ancient language of Caledonia, expreſs the name of this once famous nation by the term *Pictich;* a name familiar to the ears of the moſt illiterate, who could never have derived it from the Roman authors. The word *Pictich* means *pilferers* or *plunderers.* The appellation was probably impoſed upon this people by their neighbours, or aſſumed by themſelves, ſome time after the reign of Caracalla, when the unguarded ſtate of the Roman province, on which this people bordered, gave them frequent opportunities of making incurſions thither, and committing depredations. Accordingly this name ſeems to have been unknown till the end of the 3d century. Eumenius the Panegyriſt is the firſt Roman author who mentions this people under their new name of *Pictich*, or, with a Latin termination, *Picti*. When we ſay that this name may have been probably aſſumed for the reaſon juſt now mentioned, we muſt obſerve, that, in thoſe days of violence, the character of a robber was attended with no diſgrace. If he had the addreſs to form his ſchemes well, and to execute them ſucceſsfully, he was rather praiſed than blamed for his conduct; providing he made no encroachments on the property of his own tribe, or any of its allies. We mean this as no peculiar ſtigma upon the Picts; for other nations of antiquity, in the like rude ſtate, thought and acted as they did. See THUCYDIDES, lib. 3. p. 3. and VIRG. Æn. 7. 745 & 749.

Origin.

Concerning the origin of the Picts, authors are much divided. Boethius derives them from the Agathyrſi, Pomponius Lætus from the Germans, Bede from the Scythians, Cambden and father Innes from the ancient Britons, Stillingfleet from a people inhabiting the Cherſoneſus Cymbrica, and Keating and O'Flaherty, on the authority of the Pſalter Caſhel, derive them from the Thracians. But the moſt probable opinion is, that they were the deſcendents of the old Caledonians. Several reaſons are urged in ſupport of this opinion by Dr Macpherſon; and the words of Eumenes, "Caledonum, aliorumque Pictorum, ſilvas, *&c.*" plainly imply that the Picts and Caledonians were one and the ſame people.

Language.

As there has been much diſpute about the origin of the Picts, ſo there has been likewiſe about their language. There are many reaſons which make it plain that their tongue was the Gaelic or Celtic; and theſe reaſons are a further confirmation of their having been of Caledonian extract. Through the eaſt and north-eaſt coaſts of Scotland (which were poſſeſſed by the Picts) we meet with an innumerable liſt of names of places, rivers, mountains, &c. which are manifeſtly Galic. From a very old regiſter of the priory of St Andrews (Dalrymple's Collections, p. 122.) it appears, that in the days of Hungus, the laſt Pictiſh king of that name, St Andrew's was called *Mukroſs*; and that the town now called *Queenſferry* had the name of *Ardchinneachan*. Both theſe words are plain Gaelic. The firſt ſignifies "the heath or promontory of boars;" and the latter, "the height or peninſula of Kenneth." In the liſt of Pictiſh kings publiſhed by father Innes, moſt of the names are obviouſly Galic, and in many inſtances the ſame with the names in the liſt of Scottiſh or Caledonian kings publiſhed by the ſame author. Had Innes underſtood any thing of this language, he would not have ſuppoſed with Cambden that the Picts ſpoke the Britiſh tongue. It was unlucky that the two words on which they built their conjecture (*Strath* and *Aber*) are as common in the Galic as they could have been in the Britiſh, and at this day make a part of the names of places in countries to which the Pictiſh empire never extended. The names of *Strathfillan* and *Lochaber* may ſerve as inſtances.

The venerable Bede, as much a ſtranger to the Celtic as either of the antiquaries juſt now mentioned, is equally unhappy in the ſpecimen which he gives of the Pictiſh language in the word *penuahel*, "the head of the wall." Allowing the commutation of the initial *p* into *c*, as in ſome other caſes, this word has ſtill the ſame meaning in Gaelic, which Bede gives it in the Pictiſh. It is true, there might have been then, as well as now, a conſiderable difference between different dialects of the Celtic; and thus, perhaps, that pious author was led to diſcover five languages in Britain *agreeably to the five books of Moſes*: A conceit from which the good man derived a great deal of harmleſs ſatisfaction.

Territory.

The Picts of the earlieſt ages, as appears from the joint teſtimony of all writers who examined the ſubject, poſſeſſed only the eaſt and north-eaſt coaſt of Scotland. On one ſide, the ancient Drumalbin, or that ridge of mountains reaching from Lochlomond near Dumbarton to the frith of Taine, which ſeparates the county of Sutherland from a part of Roſs, was the boundary of the Pictiſh dominions. Accordingly we find in the life of Columba, that, in travelling to the palace of Brudius, king of the Picts, he travelled over Drumalbin, the *Dorſum Britanniæ* of Adamnan. On the other ſide, the territory of the Picts was bounded by the Roman province. After Britain was relinquiſhed by the emperor Honorius, they and the Saxons by turns were maſters of thoſe countries which lie between the frith of Edinburgh and the river Tweed. We learn from Bede, that the Saxons were maſters of Galloway when he finiſhed his Eccleſiaſtical Hiſtory. The Picts, however, made a conqueſt of that country ſoon after; ſo that, before the extinction of their monarchy, all the territories bounded on the one ſide by the Forth and Clyde, and one the other by the Tweed and Solway, fell into their hands.

History.

The hiſtory of the Picts, as well as of all the other ancient inhabitants of Britain, is extremely dark. The Iriſh hiſtorians give us a long liſt of Pictiſh kings, who reigned over Pictavia for the ſpace of eleven or thirteen centuries before the Chriſtian æra. After them Innes, in his Critical Eſſay, gives us a liſt of above fifty, of whom no leſs than five held the ſceptre, each for a whole century. It is probable that theſe writers had confounded the hiſtory of the Picts with that of their anceſtors the old Caledonians. In any other view, their accounts of them are highly fabulous; and have been long ago confuted by Dr Macpherſon of Slate, an antiquary of much learning and reſearch. The Picts, as has been already obſerved, were probably not known by that name before the 2d or 3d century. Adamnan, abbot of Jona, is the firſt author that expreſsly mentions any Pictiſh king; and the oldeſt after him is Bede. We are informed by theſe two writers that St Columba converted Brudius king of the Picts to the Chriſtian faith. Columba came into Britain in the year of the vulgar æra 565. Before that period we have no general record to aſcertain ſo much as the name of any Pictiſh king. The hiſtory of *Druſt* or *Dreſt*, who is ſaid to have reigned over the Picts in the beginning of the fifth century, when St *Ninian* firſt preached the goſpel to that nation, has all the appearance of fiction. His having reigned a hundred years, and his putting an end to a hundred wars, are ſtories which exceed all the bounds of probability.

Brudius, the cotemporary of Columba, is the firſt Pictiſh king mentioned by any writer of authority. What figure his anceſtors made, or who were his ſucceſſors on the throne of Pictavia, cannot be aſcertained. Bede informs us, that, during the reign of one of them, the Picts killed Egfred king of Northumberland in battle, and deſtroyed the greateſt part of his army. The ſame author mentions another of their kings called *Naitan*, for whom he had a particular regard. It was to this *Naitan* that Ceolfrid, abbot of Wiremouth, wrote his famous letter concerning Eaſter and the Tonſure; a letter in which Bede himſelf is ſuppoſed to have had a principal hand. Roger Hoveden and Simon of Durham mention two other Pictiſh kings *Onnuſt* and *Kinoth*, the firſt of whom died in 761, and the latter flouriſhed about the 774, and gave an aſylum to Alfred of Northumberland, who was much about that time expelled his kingdom. The accounts given by the Scots hiſtorians of ſeveral other Pictiſh kings cannot be depended on; nor are the ſtories told by the Britiſh hiſtorians, Geoffry of Monmouth and the author of the *Eulogium Britanniæ*, worthy of much greater credit.

In the ninth century the Pictiſh nation was totally ſubdued by the Scots in the reign of Kenneth Mac-Alpin. Since that time their name has been loſt in that of the conquerors, with whom they were incorporated after this conqueſt; however, they ſeem to have been treated by the Scottiſh kings with great lenity, ſo that for ſome ages after they commanded a great deal of reſpect. The prior of Hogulſtead, an old Engliſh hiſtorian, relates that they made a conſiderable figure in the army of *David* the Saint, in his diſputes with *Stephen* king of England. In a battle fought in the year 1136, by the Engliſh on one ſide, and the Scots and Picts on the other, the latter inſiſted on their hereditary right of leading the van of the Scots army, and were indulged in that requeſt by the king.

The principal ſeat of the Pictiſh kings was at Abernethy. Brudius, however, as appears from the accounts given by Adamnan, in his life of Columba, had a palace at Inverneſs, which was probably near the extremity of his territory in that quarter; for, there is no good reaſon for believing, with Cambden, that this king had any property in the Weſtern Iſles, or that he had made a gift of *Jona* to St Columba when he viſited him in that place.

With reſpect to the manners and cuſtoms of the Picts, there is no reaſon to ſuppoſe they were any other than thoſe of the old Caledonians and Scots, of which many particulars are related in the Greek and Roman writers who have occaſion to ſpeak of thoſe nations.

PICTS *Wall*, in antiquity, a wall begun by the emperor Adrian, on the northern bounds of England, to prevent the incurſions of the Picts and Scots. It was firſt made only of turf ſtrengthened with paliſadoes, till the emperor Severus, coming into Britain in perſon, built it with ſolid ſtone. This wall, part of which ſtill remains, begun at the entrance of the Solway Frith in Cumberland, and running north-eaſt extended to the German Ocean. See ADRIAN and SEVERUS.

PICTURE, a piece of painting, or a ſubject repreſented in colours, on wood, canvas, paper, or the like. See PAINTING.

PICUS, the WOODPECKER, in ornithology, a genus belonging to the order of picæ. The beak is ſtraight, and conſiſts of many ſides, and like a wedge at the point; the noſtrils are covered with briſtly feathers; the tongue is round like a worm, very long, and ſharp at the point, which is beſet with briſtles bent backwards. There are 21 ſpecies, principally diſtinguiſhed by their colour. The following are known in Britain, viz.

1. The viridis, or green woodpecker, weighs ſix ounces and a half. Its length is 13 inches, the breadth 20 and a half; the bill is duſky, triangular, and near two inches long: the crown of the head is crimſon, ſpotted with black; the eyes are ſurrounded with black, and the males have a rich crimſon mark beneath the blackneſs. The back, neck, and leſſer coverts of the wings, are green: the rump, of a pale yellow. The whole of the under part of the body is of a very pale-green; and the thighs and vent are marked with duſky lines. The legs and feet are of a cinereous green. The tail conſiſts of ten ſtiff feathers, whoſe ends are generally broken, as the bird reſts on them in climbing: their tips are black; the reſt of each is alternately barred with duſky and deep green. Theſe birds feed entirely on inſects; and their principal action is that of climbing up and down the bodies or boughs of trees: for the firſt purpoſe they are provided with a long ſlender tongue, armed with a ſharp bony end barbed on each ſide, which by the means of a curious apparatus of muſcles they can exert at pleaſure, darting it to a great length into the clifts of the bark, transfixing and drawing out the inſects that lurk there. They make their neſts in the hollows of trees: in order therefore to force their way to thoſe cavities, their bills are formed ſtrong, very hard, and wedge-like at the end; Dr Derham obſerves, that a neat ridge runs along the top, as if an artiſt had deſigned it for ſtrength and beauty. Yet it has not power to penetrate a ſound tree: their perforation of any tree is a warning to the owner to throw it down. Their legs are ſhort, but ſtrong; their thighs very muſcular: their toes diſpoſed, two backwards, two forward: the feathers of the tail are very ſtiff, ſharp-pointed, and bending downwards. The three firſt circumſtances do admirably concur to enable them to run up and down the ſides of trees with great ſecurity; and the ſtrength of the tail ſupports them firmly when they continue long in one place, either where they find plenty of food, or while they are forming an acceſs to the interior part of the timber. This form of the tail makes their flight very aukward, as it inclines their body down, and forces them to fly with ſhort and frequent jerks when they would aſcend, or even keep in a line. This ſpecies feeds oftener on the ground than any other of the genus: all of them make their neſts in the hollows of trees; and lay five or ſix eggs, of a beautiful ſemi-tranſparent white.

2. The major, or great ſpotted woodpecker, weighs

two ounces three quarters; the length is nine inches; the breadth is 16. The bill is one and a quarter long, of a black horn colour. The irides are red. The forehead is of a pale buff colour; the crown of the head a gloſſy black; the hind-part marked with a rich deep crimſon ſpot. The cheeks are white; bounded beneath by a black line that paſſes from the corner of the mouth and ſurrounds the hind-part of the head. The neck is encircled with a black colour. The throat and breaſt are of a yellowiſh white; the vent-feathers of a fine light crimſon. The back, rump, and coverts of the tail, and leſſer coverts of the wings, are black; the ſcapular feathers and coverts adjoining to them, are white. The quill-feathers are black, elegantly marked on each web with round white ſpots. The four middle feathers of the tail are black, the next tipped with dirty yellow; the bottoms of the two outmoſt, black; the upper parts, a dirty white. The exterior feathers marked on each web with two black ſpots; the next with two on the inner web, and only one on the other. The legs are of a lead colour. The female wants that beautiful crimſon ſpot on the head; in other reſpects the colours of both agree. This ſpecies is much more uncommon than the preceding; and keeps altogether in the woods.

3. The medius, or middle-ſized woodpecker, agrees with the preceding in colours and ſize, excepting that the crown of the head in this is of a rich crimſon; the crown of the head in the male of the former, black; and the crimſon is in form of a bar on the hind part. Birds thus marked have been ſhot in Lancaſhire and other parts of England; but Mr Pennant is doubtful whether they are varieties, or diſtinct ſpecies.

4. The minor, or leaſt ſpotted woodpecker, ſcarce weighs an ounce: the length is ſix inches; the breadth eleven. The forehead is of a dirty white: the crown of the head (in the male) of a beautiful crimſon: the cheeks and ſides of the neck are white, bounded by a bed of black beneath the former. The hind part of the head and neck, and the coverts of the wings, are black: the back is barred with black and white: the ſcapulars and quill-feathers ſpotted with black and white: the four middle feathers of the tail are black; the others varied with black and white: the breaſt and belly are of a dirty white: the crown of the head (in the female) is white; the feet are of a lead colour. It has all the characters and actions of the greater kind, but is not ſo often met with.

PICUS (John), earl of Mirandula, a prodigy of parts and learning, was the youngeſt child of John Francis Picus, earl of Mirandula and Concordia; and was born in the year 1463. The progreſs that he made in letters was ſo extremely rapid, that it was matter of aſtoniſhment to ſee even a boy one of the firſt poets and orators of his age. After viſiting the moſt famous univerſities of France and Italy, he went to Rome; where, in 1486, before he was 24 years of age, he publiſhed 900 propoſitions in logic, mathematics, phyſics, divinity, cabaliſtic learning, and magic, drawn not only from Greek and Latin, but even from Jewiſh and Arabian writers: ſubjoining to his advertiſement, that, "if any philoſopher or divine would come to Rome to diſpute with him, upon any or all of them, he would defray the expences of his journey from the remoteſt corners of Italy." He enjoyed, however, the honour of this diſputatious challenge quietly, without danger to his credit; for envy procured ſome of his propoſitions to be charged with hereſy, and he was forbid to diſpute upon them. At the age of 28, he confined himſelf wholly to the ſtudy of the ſcriptures; and undertook to combat the Jews and Mahometans, as well as to confound judicial aſtrology; but in this intention his credit was alſo ſaved, tho' with the loſs of his life, by his dying in 1494, in his 32d year. He was called the *phœnix of his age*; and compoſed a great number of works, which have often been printed both ſeparately and together.

PICUS (John Francis), prince of Mirandula, nephew of John Picus mentioned above, was born about the year 1469. He cultivated learning and the ſciences after the example of his uncle; but he had a principality and dominions to ſuperintend, which involved him in great troubles, and at laſt coſt him his life. He was twice driven from his principality, and twice reſtored; and at laſt, in 1533, was, together with his eldeſt ſon Albert, aſſaſſinated in his own caſtle by his nephew Galeoti. He was a great lover of letters; and ſuch of his works as were then compoſed, were inſerted in the Straſburgh edition of his uncle's in 1504, and continued in future impreſſions, beſides ſome others, which were never collected.

PIECE, in matters of money, ſignifies ſometimes the ſame thing with ſpecies; and ſometimes, by adding the value of the pieces, it is uſed to expreſs ſuch as have no other particular name. For the piece of eight, or piaſtre, ſee MONEY-*Table*.

PIECE, is alſo a kind of money of account, or rather a manner of accounting uſed among the negroes on the coaſt of Angola in Africa. See MONEY-*Table*.

PIECE, in heraldry, denotes an ordinary or charge. —The honourable pieces of the ſhield are the chief, feſs, bend, pale, bar, croſs, ſaltier, chevron, and in general all thoſe which may take up one-third of the field, when alone, and in what manner ſoever it be. See HERALDRY.

PIECES, in the military art, include all ſorts of great guns and mortars. Battering pieces are the larger ſort of guns uſed at ſieges for making the breaches; ſuch are the 24-pounder and culverine, the one carrying a 24 and the other an 18 pound ball. Field-pieces are 12-pounders, demiculverines, 6-pounders, ſackers, minions, and 3-pounders, which march with the army, and encamp always behind the ſecond line, but in day of battle are in the front.—A ſoldier's firelock is likewiſe called his *piece*.

PIEDMONT, a country of Italy, with the title of a principality; bounded on the north by Vallois; on the eaſt, by the duchy of Milan and the duchy of Montferrat; on the ſouth, by the county of Nice and the territory of Genoa; and on the weſt, by Dauphiny and Savoy. It comprehends 11 ſmall provinces, Piedmont Proper, the valleys between France and Italy, the valley of Saluza, the county of Nice, the marquiſate of Suſa, the duchy of Aoſt, the Canaveſe, the lordſhip of Verſail, the county of Aſt, and the Langes. It was formerly a part of Lombardy; but now belongs to the king of Sardinia; and lies at the foot of the Alps, which ſeparate France from Italy. It is 175 miles in length, and 40 in breadth. It contains many high mountains; among which there are rich and fruitful

ful valleys, as pleaſant and populous as any part of Italy. In the mountains are mines of ſeveral kinds, and the foreſts afford a great deal of game. The Piedmonteſe have more ſenſe than the Savoyards, but then they are not ſo ſincere. They are generally ſtrongly attached to the Roman Catholic religion; and carry on ſo great a trade in raw ſilk, that the Engliſh alone have purchaſed to the value of 200,000 pounds in a year. Beſides this, they have corn, rice, wine, fruits, hemp, flax, and cattle. Their ſovereign is the king of Sardinia; who generally reſides at Turin, the capital of this country. The valleys between France and Italy are inhabited by the Vaudeſe, who are Proteſtants. Towards the end of the laſt century, the French king perſuaded the duke of Savoy to drive them out of the country, in conſequence of which 20,000 of them retired to Germany, England, and Holland; and yet they are not at all extirpated, tho' they are obliged to have a Roman Catholic church in every pariſh.

PIERIA (anc. geog.), a diſtrict of Macedonia, contained between the mouths of the rivers Ludias and Peneus; extended by Strabo beyond the Ludias, to the river Axios on the north, and on the ſouth no farther than the Aliacmon, along the weſt ſide of the Sinus Thermaicus.—Another *Pieria* of Syria, the north part of Seleucis, or the *Antiochena*, ſituate on the Sinus Iſſicus, and lying next Cilicia to the north-weſt.

PIERIS (anc. geog.), a mountain which is thought to have given name to Pieria of Macedonia; taking its name from Pierus a poet, who was the firſt that ſacrificed to the Muſes, thence called *Pierides*, if credit may be given to an ancient ſcholiaſt on Juvenal.

PIEPOUDRE (*Court of*), the loweſt, and at the ſame time the moſt expeditious, court of juſtice known to the law of England. It is called PIEPOUDRE, (*curia pedis pulverizati*), from the duſty feet of the ſuitors; or, according to Sir Edward Coke, becauſe juſtice is there done as ſpeedily as duſt can fall from the foot: Upon the ſame principle that juſtice among the Jews was adminiſtered in the gate of the city, that the proceedings might be the more ſpeedy, as well as public. But the etymology given us by a learned modern writer is much more ingenious and ſatisfactory; it being derived, according to him, from *pied puldreaux*, "a pedlar," in old French, and therefore ſignifying the court of ſuch petty chapmen as reſort to fairs or markets. It is a court of record, incident to every fair and market; of which the ſteward of him who owns or has the toll of the market, is the judge. It was inſtituted to adminiſter juſtice for all commercial injuries done in that very fair or market, and not in any preceding one. So that the injury muſt be done, complained of, heard, and determined, within the compaſs of one and the ſame day, unleſs the fair continues longer. The court hath cognizance of all matters of contract that can poſſibly ariſe within the precinct of that fair or market; and the plaintiff muſt make oath that the cauſe of an action aroſe there. From this court a writ of error lies, in the nature of an appeal, to the courts at Weſtminſter. The reaſon of its inſtitution ſeems to have been, to do juſtice expeditiouſly among the variety of perſons that reſort from diſtant places to a fair or market; ſince it is probable, that no other inferior court might be able to ſerve its proceſs, or execute its judgments, on both or perhaps either of the parties; and therefore, unleſs this court had been erected, the complaint muſt neceſſarily have reſorted even in the firſt inſtance to ſome ſuperior judicature.

PIER, in building, denotes a maſs of ſtone, &c. oppoſed by way of fortreſs to the force of the ſea, or a great river, for the ſecurity of ſhips that lie at harbour in any haven.

PIERIDES, in fabulous hiſtory, the daughters of Pierus a Macedonian prince, preſuming to diſpute with the muſes for the prize of poetry, were turned into magpies. The name of *Pierides* was alſo given to the muſes, from mount Pieris in Theſſaly, which was conſecrated to them; or, according to others, from Pierus, a Theſſalian poet, who was the firſt who ſacrificed to them. See PIERIS.

PIERINO DEL VAGA, an eminent Italian painter, born of poor parents in Tuſcany, about the year 1500. He was placed apprentice with a grocer in Florence, and got ſome inſtructions from the painters to whom he was ſent with colours and pencils; but a painter named *Vaga* taking him to Rome, he was called *Del Vaga*, from living with him, his real name being *Buonacorſi*. He ſtudied anatomy with the ſciences neceſſary for his profeſſion; and had ſomewhat of every thing that was good in his compoſitions. After Raphael's death, he joined with Julio Romano and Franciſco Penni to finiſh the works in the Vatican which were left imperfect by their common maſter; and to confirm their friendſhip, married Penni's ſiſter. He gained the higheſt reputation by his performances in the palace of prince Doria at Genoa: but the multiplicity of his buſineſs and the vivacity of his imagination, drained his ſpirits in the flower of his age; for he died in the year 1547.

PIETISTS, a religious ſect ſprung up among the Proteſtants of Germany, ſeeming to be a kind of mean between the Quakers of England, and the Quietiſts of the Romiſh church.

They deſpiſe all ſorts of eccleſiaſtical polity, all ſchool theology, and all forms and ceremonies, and give themſelves up to contemplation and the myſtic theology.

PIG, in zoology. See SUS.

Guinea-PIG. See MUS.

PIG *of Lead*, the eighth part of a fother, amounting to 250 pounds weight.

PIGEON, in ornithology. See COLUMBA.

Carrier-PIGEON. See CARRIER, and COLUMBA.

PIGMENTS, preparations uſed by painters, dyers, &c. to impart colours to bodies, or to imitate particular colours. See COLOUR-*Making*, and DYEING.

PI-HAHIROTH, (Moſes); underſtood to be a mouth or narrow paſs between two mountains, called *Chiroth*, or *Eiroth*, and lying not far from the bottom of the weſtern coaſt of the Arabian gulf; before which mouth the children of Iſrael encamped, juſt before their entering the Red Sea, (Wells).

PIKE, in ichthyology. See ESOX.

The pike never ſwims in ſhoals as moſt other fiſh do, but always lies alone; and is ſo bold and ravenous, that he will ſeize upon almoſt any thing leſs than himſelf. This fiſh breeds but once in a year, which is in March. It is found in almoſt all freſh waters; but is very different in goodneſs, according to the nature of the places where it lives. The fineſt pike are thoſe which feed in clear rivers; thoſe in ponds and meres are inferior to theſe, and the worſt of all are thoſe of the fen ditches. They are very plentiful in theſe laſt places, where the water is foul and coloured; and their food, ſuch as frogs and the like, very plentiful, but very coarſe; ſo that they grow large, but are yellowiſh and high-bellied, and differ greatly from thoſe which live in the clearer waters.

The fiſhermen have two principal ways of catching the pike; by the ledger, and by the walking-bait.

The ledger-bait is fixed in one certain place, and may continue while the angler is abſent. This muſt be a live bait, a fiſh or frog: and among fiſh, the dace, roach, and gudgeon, are the beſt; of frogs, the only caution is to chooſe the largeſt and yelloweſt that can be met with. If the bait be a fiſh, the hook is to be ſtuck through the upper lip, and the line muſt be 14 yards at leaſt in length; the other end of this is to be tied to a bough of a tree, or to a ſtick driven into the ground near the pike's haunt, and all the line wound round a forked ſtick, except about half a yard. The bait will by this means keep playing ſo much under water, and the pike will ſoon lay hold of it.

If the bait be a frog, then the arming wire of the hook ſhould be put in at the mouth, and out at the ſide; and with a needle and ſome ſtrong ſilk, the hinder-leg of one ſide is to be faſtened by one ſtitch to the wire-arming of the hook. The pike will ſoon ſeize this, and muſt have line enough to give him leave to get to his haunt and poach the bait.

The trolling for pike is a pleaſant method alſo of taking them: in this a dead bait ſerves, and none is ſo proper as a gudgeon.

This is to be pulled about in the water till the pike ſeizes it; and then it is to have line enough, and time to ſwallow it: the hook is ſmall for this ſport, and has a ſmooth piece of lead fixed at its end to ſink the bait; and the line is very long, and runs through a ring at the end of the rod, which muſt not be too ſlender at top.

The art of feeding pike, ſo as to make them very fat, is the giving them eels; and without this it is not to be done under a very long time; otherwiſe perch, while ſmall, and their prickly fins tender, are the beſt food for them. Bream put into a pike-pond are a very proper food: they will breed freely, and their young ones make excellent food for the pike, who will take care that they ſhall not increaſe over much. The numerous ſhoals of roaches and ruds, which are continually changing place, and often in floods get into the pike's quarters, are food for them for long time.

Pike, when uſed to be fed by hand, will come up to the very ſhore, and take the food that is given them out of the fingers of the feeder. It is wonderful to ſee with what courage they will do this, after a while practiſing; and it is a very diverting ſight when there are ſeveral of them nearly of the ſame ſize, to ſee what ſtriving and fighting there will be for the beſt bits when they are thrown in. The moſt convenient place is near the mouth of the pond, and where there is about half a yard depth of water; for, by that means, the offal of the feedings will all lie in one place, and the deep water will ſerve for a place to retire into and reſt in, and will be always clean and in order.

Carp will be fed in the ſame manner as pike; and though by nature a fiſh as remarkably ſhy and timorous as the pike is bold and fearleſs, yet by cuſtom they will come to take their food out of the perſon's hand; and will, like the pike, quarrel among one another for the niceſt bits.

PIKE, in war, an offenſive weapon, conſiſting of a wooden ſhaft, 12 or 14 feet long, with a flat ſteel head, pointed, called the *ſpear*. This weapon was long in uſe among the infantry; but now the bayonet, which is fixed on the muzzle of the firelock, is ſubſtituted in its ſtead. It is ſtill uſed by ſome of the officers of infantry, under the name of *ſponton*.—The Macedonian phalanx was a battalion of pike-men.

PILASTER, in architecture. See there, n° 55.

PILCHARD, in ichthyology, a fiſh which has a general likeneſs to the herring, but differs in ſome particulars very eſſential. The body of the pilchard is leſs compreſſed than that of the herring, being thicker and rounder: the noſe is ſhorter in proportion, and turns up: the under jaw is ſhorter. The back is more elevated; the belly leſs ſharp: the dorſal fin of the pilchard is placed exactly in the centre of gravity, ſo that when taken up by it, the body preſerves an equilibrium, whereas that of the herring dips at the head: The ſcales of the pilchard adhere very cloſely, whereas thoſe of the herring very eaſily drop off. The pilchard is in general leſs than the herring; but it is fatter, or more full of oil.

The pilchard appears in vaſt ſhoals off the Corniſh coaſts about the middle of July, diſappearing the beginning of winter, yet ſometimes a few return again after Chriſtmas. Their winter retreat is the ſame with that of the herring, and their motives for migrating the ſame †. They affect, during ſummer, a warmer latitude; for they are not found in any quantities on any of our coaſts except thoſe of Cornwall, that is to ſay, from Fowey harbour to the Scilly iſles, between which places the ſhoals keep ſhifting for ſome weeks. The approach of the pilchard is known by much the ſame ſigns as thoſe that indicate the arrival of the herring. Perſons, called in Cornwall *huers*, are placed on the cliffs, to point to the boats ſtationed off the land the courſe of the fiſh. By the 1ſt of James I. c. 23, fiſhermen are empowered to go on the grounds of others to hue, without being liable to actions of treſpaſs, which before occaſioned frequent lawſuits.

The emoluments that accrue to the inhabitants of that county are great, and are beſt expreſſed in the words of Dr W. Borlaſe, in his account of the Pilchard Fiſhery. "It employs a great number of men on the ſea, training them thereby to naval affairs; employs men, women, and children, at land, in ſalting, preſſing, waſhing, and cleaning, in making boats, nets, ropes, caſks, and all the trades depending on their conſtruction and ſale. The poor is fed with the offals of the captures; the land with the refuſe of the fiſh and ſalt; the merchant finds the gains of commiſſion and honeſt commerce; the fiſherman, the gains of the fiſh. Ships are often freighted hither with ſalt, and into foreign countries with the fiſh, carrying off at the ſame time part of our tin. The uſual produce of the number of hogſheads exported each year, for ten years, from 1747 to 1756 incluſive, from the

† See *Clupea*.

four ports of Fowy, Falmouth, Penzance, and St Ives, it appears that Fowy has exported yearly 1732 hogſheads; Falmouth, 14,631 hogſheads and two-thirds; Penzance and Mounts-Bay, 12,149 hogſheads and one-third; St Ives, 1282 hogſheads: in all amounting to 29,795 hogſheads. Every hogſhead for ten years laſt paſt, together with the bounty allowed for every hogſhead exported, and the oil made out of each hogſhead, has amounted, one year with another at an average, to the price of 1 *l.* 13 *s.* 3 *d.*; ſo that the caſh paid for pilchards exported has, at a medium, annually amounted to the ſum of 49,532 *l.* 10 *s.*" The numbers that are taken at one ſhooting out of the nets, is amazingly great. Mr Pennant ſays, that Dr Borlaſe aſſured him, that on the 5th of October 1767, there were at one time incloſed in St Ives's Bay 7000 hogſheads, each hogſhead containing 35,000 fiſh, in all 245,000,000.

PILE, in heraldry, an ordinary in form of a wedge, contracting from the chief, and terminating in a point towards the bottom of the ſhield.

Pile, in antiquity, a pyramid built of wood, on which the bodies of the deceaſed were laid in order to be burnt.

Pile, in building, is uſed for a large ſtake rammed into the ground in the bottom of rivers, or in marſhy land, for a foundation to build upon.

Pile is alſo uſed among architects for a maſs of building.

Pile, in coinage, denotes a kind of puncheon, which, in the old way of coining with the hammer, contained the arms or other figure and inſcription to be ſtruck on the coin. See Coinage.

Accordingly we ſtill call the arms-ſide of a piece of money the *pile*, and the head the *croſs*; becauſe in ancient coin, a croſs uſually took the place of the head in ours.

Pile-*Engine*, a very curious machine invented by Mr Vauloue for driving the piles of Weſtminſter bridge. It is repreſented Plate CCXLV. A is a great upright ſhaft or axle, on which are the great wheel B, and the drum C, turned by horſes joined to the bars S, S. The wheel B turns the trundle X, on the top of whoſe axis is the fly O, which ſerves to regulate the motion, and alſo to act againſt the horſes, and to keep them from falling when the heavy ram Q is diſcharged to drive the pile P down into the mud in the bottom of the river. The drum C is looſe upon the ſhaft A, but is locked to the wheel B by the bolt Y. On this drum the great rope HH is wound; one end of the rope being fixed to the drum, and the other to the follower G, to which it is conveyed over the pulleys I and K. In the follower G is contained the tongs F, that takes hold of the ram Q by the ſtaple R, for drawing it up. D is a ſpiral or fuſy fixed to the drum, on which is wound the ſmall rope T that goes over the pulley U, under the pulley V, and is faſtened to the top of the frame at 7. To the pulley-block V is hung the counterpoiſe W, which hinders the follower T from accelerating as it goes down to take hold of the ram; for as the follower tends to acquire velocity in its deſcent, the line T winds downwards upon the fuſy, on a larger and larger radius, by which means the counterpoiſe W acts ſtronger and ſtronger againſt it; and ſo allows it to come down with only a moderate and uniform velocity. The bolt Y locks the drum to the great wheel, being puſhed upward by the ſmall lever 2, which goes through a mortoiſe in the ſhaft A, turns upon a pin in the bar 3, fixed to the great wheel B, and has a weight 4, which always tends to puſh up the bolt Y through the wheel into the drum. L is the great lever turning on the axis *m*, and reſting upon the forcing bar 5, 5, which goes through a hollow in the ſhaft A, and bears up the little lever 2.

By the horſes going round, the great rope H is wound about the drum C, and the ram Q is drawn up by the tongs F in the follower G, until the tongs comes between the inclined planes E; which, by ſhutting the tongs at the top, opens it at the foot, and diſcharges the ram which falls down between the guides *bb* upon the pile P, and drives it by a few ſtrokes as far into the mud as it will go; after which, the top part is ſawed off cloſe to the mud by an engine for that purpoſe. Immediately after the ram is diſcharged, the piece 6 upon the follower G takes hold of the ropes *aa*, which raiſe the end of the lever L, and cauſe its end N to deſcend and preſs down the forcing bar 5 upon the little lever 2, which, by pulling down the bolt Y, unlocks the drum C from the great wheel B; and then the follower being at liberty, comes down by its own weight to the ram; and the lower ends of the tongs ſlip over the ſtaple R, and the weight of their heads cauſes them to fall outward, and ſhuts upon it. Then the weight 4 puſhes up the bolt Y into the drum, which locks it to the great wheel, and ſo the ram is drawn up as before.

As the follower comes down it cauſes the drum to turn backward, and unwinds the rope from it, whilſt the horſes, great wheel, trundle and fly, go on with an uninterrupted motion; and as the drum is turning backward, the counterpoiſe W is drawn up, and its rope T wound upon the ſpiral fuſy D.

There are ſeveral holes in the under ſide of the drum, and the bolt Y always takes the firſt one that it finds when the drum ſtops by the falling of the follower upon the ram; until which ſtoppage the bolt has not time to ſlip into any of the holes.

This engine was placed upon a barge on the water, and ſo was eaſily conveyed to any place deſired. The ram was a ton weight; and the guides *bb*, by which it was let fall, were 30 feet high.

PILES, in medicine, the ſame with hæmorrhoids. See Medicine, nº 354, 358.

PILGRIM, one who travels through foreign countries to viſit holy places, and to pay his devotion to the reliques of dead ſaints. See Pilgrimage.

The word is formed from the Flemiſh *pelgrim*, or Italian *pelegrino*, which ſignifies the ſame; and thoſe originally from the Latin *peregrinus*, a "ſtranger or traveller."

PILGRIMAGE, a kind of religious diſcipline, which conſiſts in taking a journey to ſome holy place, in order to adore the relics of ſome deceaſed ſaint. Pilgrimages began to be made about the middle ages of the church; but they were moſt in vogue after the end of the 11th century, when every one was for viſiting places of devotion, not excepting kings and princes themſelves; and even biſhops made no difficulty of being abſent from their churches on the ſame account.

The places moſt viſited were Jeruſalem, Rome, Compoſtella, and Tours; but the greateſt numbers now reſort to Loretto, in order to viſit the chamber of the bleſſed virgin, in which ſhe was born, and brought up her ſon Jeſus till he was 12 years of age.

PILKINGTON (Lætitia), a famous poetical genius, the daughter of Dr Van Lewin, a phyſician of Dublin, where ſhe was born in 1712. She was married very young to the rev. Matthew Pilkington, a poet alſo of no inconſiderable merit; and theſe two wits, as is often the caſe, lived very unhappily together. They were at length totally ſeparated, on the huſband accidentally diſcovering a gentleman in her bedchamber at two o'clock in the morning; a circumſtance which ſhe accounted for in a very unſatisfactory manner. The ſtory is told at large in her Memoirs; where ſhe ſays, "Lovers of learning, I am ſure, will pardon me, as I ſolemnly declare it was the attractive charms of a new book, which the gentleman would not lend me, but conſented to ſtay till I read it through, that was the ſole motive of my detaining him." As there are not wanting ſome who form objections to the marrying learned wives, the chance of ſuch literary appointments may perhaps be added to the liſt of them. After this unlucky adventure, Mrs Pilkington came to London; and having recourſe to her pen for ſubſiſtence, through the means of Colley Cibber, ſhe lived ſome time on the contributions of the great. She was however thrown into the Marſhalſea for debt; and being ſet at liberty, opened a pamphlet ſhop. She raiſed at length a handſome ſubſcription for her Memoirs; which are written with great ſprightlineſs and wit, containing ſeveral entertaining anecdotes of dean Swift, with whom ſhe was intimate, at well as many pretty little pieces of her poetry. This ingenious but unhappy woman is ſaid at laſt to have killed herſelf with drinking, at Dublin, in 1750.

PILL, in pharmacy, a form of medicine reſembling a little ball, to be ſwallowed whole; invented for ſuch as cannot take bitter and ill-taſted medicinal draughts; as alſo to keep in readineſs for occaſional uſe without decaying. See PHARMACY, n° 854, &c.

PILLAR, in architecture. See ARCHITECTURE, n° 38.

PILLAR, in the manege, is the centre of the ring, or manege-ground, round which a horſe turns, whether there be a pillar in it or not. Beſides this, there are pillars on the circumference or ſides of the manege-ground, placed at certain diſtances, by two and two, from whence they are called the *two pillars*, to diſtinguiſh them from that of the centre. The uſe of the pillar in the centre, is for regulating the extent of ground, that the manege upon the volts may be performed with method and juſtneſs, and that they may work in a ſquare, by rule and meaſure, upon the four lines of the volts; and alſo to break unruly high-mettled horſes, without endangering the rider. The two pillars are placed at the diſtance of two or three paces one from the other, and the horſe is put between thoſe, to teach him to riſe before, and yerk out behind, and put himſelf upon raiſed airs, &c. either by the aids, or chaſtiſements.

PILLORY, (*colliſtrigium*, "collum ſtringens;" *pilloria*, from the French *pilleur*, i. e. *depeculator*, or *pelori;* derived from the Greek πυλη, *janua*, a "door," becauſe one ſtanding on the pillory puts his head as it were through a door; and ορεω, *video*), is an engine made of wood to puniſh offenders, by expoſing them to public view, and rendering them infamous. There is a *ſtatute of the pillory*, 51 Hen. III. And by ſtatute it is appointed for bakers, foreſtallers, and thoſe who uſe falſe weights, perjury, forgery, &c. 3 *Inſt*. 219. Lords of leets are to have a pillory and tumbrel, or it will be the cauſe of forfeiture of the leet; and a vill may be bound by preſcription to provide a pillory, &c. 2 *Hawk*. P. C. 73.

PILOT, the officer who ſuperintends the navigation, either upon the ſea-coaſt or on the main ocean. It is, however, more particularly applied by our mariners to the perſon charged with the direction of a ſhip's courſe on or near the ſea-coaſt, and into the roads, bays, rivers, havens, &c. within his reſpective diſtrict.

Pilots of ſhips, taking upon them to conduct any ſhip from Dover, &c. to any place up the river Thames, are to be firſt examined and approved by the maſter and wardens of the ſociety of Trinity Houſe, &c. or ſhall forfeit 10l. for the firſt offence, 20l. for the ſecond, and 40l. for every other offence; one moiety to the informer, the other to the maſter and wardens; but any maſter or mate of a ſhip, may pilot his own veſſel up the river: and if any ſhip be loſt through the negligence of any pilot, he ſhall be for ever after diſabled to act as a pilot. 3 Geo. I. c. 13. Alſo the Lord Warden of the Cinque Ports may make rules for government of pilots, and order a ſufficient number to ply at ſea to conduct ſhips up to the Thames: 7 Geo. I. c. 21. No perſon ſhall act as a pilot on the Thames, &c. (except in collier ſhips) without a licence from the maſter and wardens of Trinity-Houſe at Deptford, on pain of forfeiting 20l. And pilots are to be ſubject to the government of that corporation; and pay ancient dues, not exceeding 1 s. in the pound, out of wages, for the uſe of the poor thereof. Stat. 5 Geo. II. c. 20.

By the laws of France, no perſon ſhall be received as pilot, till he has made ſeveral voyages, and paſſed a ſtrict examination; and after that, on his return in long voyages, he is to lodge a copy of his journal in the admiralty: and if a pilot occaſion the loſs of a ſhip, he is to pay 100 livres fine, and to be for ever deprived of the exerciſe of pilotage; and if he doth it deſignedly, be puniſhed with death. *Lex. Mercat.* 70, 71.

The laws of Oleron ordain, That if any pilot deſignedly miſguide a ſhip, that it may be caſt away, he ſhall be put to a rigorous death, and hung in chains: and if the lord of a place, where a ſhip be thus loſt, abet ſuch villains in order to have a ſhare of the wreck, he ſhall be apprehended, and all his goods forfeited for the ſatisfaction of the perſons ſuffering; and his perſon ſhall be faſtened to a ſtake in the midſt of his own manſion, which, being fired on the four corners, ſhall be burned to the ground, and he with it. *Leg. Ol.* c. 25. And if the fault of a pilot be ſo notorious, that the ſhip's crew ſee an apparent wreck, they may lead him to the hatches, and ſtrike off his head; but the common law denies this haſty execution: an ignorant pilot is ſentenced to paſs thrice under the ſhip's keel, by the laws of Denmark. *Lex Mercat.* 70.

The regulations, with regard to pilots in the royal navy, are as follow: The commanders of the king's ſhips, in order to give all reaſonable encouragement to ſo

Pilot ‖ Pimpinella.

Pimpinella.

ſo uſeful a body of men as pilots, and to remove all their objections to his Majeſty's ſervice, are ſtrictly charged to treat them with good uſage, and an equal reſpect with warrant-officers.

“ The purſer of the ſhip is always to have a ſet of bedding provided on board for the pilots; and the captain is to order the boatſwain to ſupply them with hammocs, and a convenient place to lie in, near their duty, and apart from the common men; which bedding and hammocs are to be returned when the pilots leave the ſhip.

“ A pilot, when conducting one of his Majeſty's ſhips in pilot-water, ſhall have the ſole charge and command of the ſhip, and may give orders for ſteering, ſetting, trimming, or furling the ſails; tacking the ſhip; or whatever concerns the navigation: and the captain is to take care that all the officers and crew obey his orders. But the captain is diligently to obſerve the conduct of the pilot; and if he judges him to behave ſo ill as to bring the ſhip into danger, he may remove him from the command and charge of the ſhip, and take ſuch methods for her preſervation as ſhall be judged neceſſary; remarking upon the log-book, the exact hour and time when the pilot was removed from his office, and the reaſons aſſigned for it.

“ Captains of the king's ſhips, employing pilots in foreign parts of his majeſty's dominions, ſhall, after performance of the ſervice, give a certificate thereof to the pilot, which being produced to the proper naval officer, he ſhall cauſe the ſame to be immediately paid; but if there be no naval-officer there, the captain of his majeſty's ſhip ſhall pay him, and ſend the proper vouchers, with his bill, to the navy-board, in order to be paid as bills of exchange.

“ Captains of his majeſty's ſhips, employing foreign pilots to carry the ſhips they command into or out of foreign ports, ſhall pay them the rates due by the eſtabliſhment or cuſtom of the country, before they diſcharge them; whoſe receipts being duly vouched, and ſent, with a certificate of the ſervice performed, to the navy-board, they ſhall cauſe them to be paid with the ſame exactneſs as they do bills of exchange.” *Regulations and Inſtructions of the Sea-ſervice, &c.*

PIMENTO, in botany, JAMAICA PEPPER, or *All-ſpice.* See MYRTUS, of which it is a ſpecies.

The fruits are gathered when green, and are expoſed to the ſun for many days on cloths, frequently ſhaking and turning them till they are thoroughly dry: great care is taken that they be not wetted by the morning and evening dews; and when thus dry, they are ſent over to us.

Pimento abounds with a fragrant eſſential oil, which is ſeparated in great quantity in diſtillation, and is ſo heavy that it ſinks in water. This ſpice is much uſed in our foods, and ſometimes in medicine: it is indeed a very good aromatic, and imitates the flavour of all the reſt; ſo that the eſſential oil of Jamaica pepper is frequently ſubſtituted in the room of thoſe drawn from the more coſtly ſpices.

PIMPINELLA, BURNET SAXIFRAGE; a genus of the digynia order, belonging to the pentandria claſs of plants. There are ſeven ſpecies; the moſt remarkable of which are, 1. The major, or greater burnet ſaxifrage, growing naturally in chalky woods, and on the ſides of the banks near hedges, in ſeveral parts of England. The lower leaves of this ſort are winged; the lobes are deeply ſawed on their edges, and ſit cloſe to the midrib, of a dark green. The ſtalks are more than a foot high, dividing into four or five branches. The lower part of the ſtalk is garniſhed with winged leaves, ſhaped like thoſe at the bottom, but ſmaller: thoſe upon the branches are ſhort and trifid: the branches are terminated by ſmall umbels of white flowers, which are compoſed of ſmaller umbels or rays. The flowers have five heart-ſhaped petals, which turn inward, and are ſucceeded by two narrow, oblong, channelled ſeeds. 2. The aniſum, or common aniſe, is an annual plant, which grows naturally in Egypt; but is cultivated in Malta and Spain, from whence the ſeeds are annually imported into Britain. The lower leaves of this plant are divided into three lobes, which are deeply cut on their edges: the ſtalk riſes a foot and a half high, dividing into ſeveral ſlender branches garniſhed with narrow leaves, cut into three or four narrow ſegments, terminated by pretty large looſe umbels, compoſed of ſmaller umbels or rays, which ſtand on pretty long foot-ſtalks. The flowers are ſmall, and of a yellowiſh white; the ſeeds are oblong and ſwelling.—The former ſpecies requires no culture; the latter is too tender to be cultivated for profit in this country. However, the ſeeds will come up if ſown, in the beginning of April, upon a warm border. When they come up, they ſhould be thinned, and kept clear of weeds; which is all the culture they require.

USES. Both theſe ſpices are uſed in medicine. The roots of pimpinella have a grateful, warm, very pungent taſte, which is entirely extracted by rectified ſpirit: in diſtillation the menſtruum ariſes, leaving all that it had taken up from the root united into a pungent aromatic reſin. This root promiſes, from its ſenſible qualities, to be a medicine of conſiderable utility, though little regarded in common practice: the only officinal compoſition in which it is an ingredient is the *pulvis ari compoſitus.* Stahl, Hoffman, and other German phyſicians, are extremely fond of it; and recommend it as an excellent ſtomachic, reſolvent, detergent, diuretic, diaphoretic, and alexipharmac. They frequently gave it, and not without ſucceſs, in ſcorbutic and cutaneous diſorders, foulneſs of the blood and juices, tumours and obſtructions of the glands, and diſeaſes proceeding from a deficiency of the fluid ſecretions in general. Boerhaave directs the uſe of this medicine in aſthmatic and hydropic caſes, where the ſtrongeſt reſolvents are indicated: the form he prefers is a watery infuſion; but the ſpirituous tincture poſſeſſes the virtues of the root in much greater perfection.

Aniſeeds have an aromatic ſmell, and a pleaſant warm taſte, accompanied with a degree of ſweetneſs. Water extracts very little of their flavour, rectified ſpirit the whole.

Theſe ſeeds are in the number of the four greater hot ſeeds: their principal uſe is in cold flatulent diſorders, where tenacious phlegm abounds, and in the gripes to which young children are ſubject. Frederic Hoffman ſtrongly recommends them in weakneſs of the ſtomach, diarrhœas, and for ſtrengthening the tone of the viſcera in general; and thinks they well deſerve the appellation given them by Helmont, *inteſtinorum*

norum ſolamen. The ſmaller kind of aniſeeds brought from Spain are preferred.

PIN, in commerce, a little neceſſary inſtrument, made of braſs wire, chiefly uſed by women in adjuſting their dreſs.

The perfection of pins conſiſts in the ſtiffneſs of the wire and its ſmoothneſs, in the heads being well turned, and in the fineneſs of the points. The London pointing and whitening are in moſt repute; becauſe the pin-makers in that city, in pointing, uſe two ſteel mills; one of which forms the point, and the other takes of all irregularities, and renders it ſmooth and as it were poliſhed. In whitening, they uſe block-tin granulated; whereas in other countries they are ſaid to uſe a mixture of tin, lead, and quickſilver. The conſumption of pins is incredible, and there is no commodity ſold cheaper. The number of hands employed in this manufacture is very great, each pin paſſing through the hands of ſix different workmen, between the drawing of the braſs wire and the ſticking of the pin in the paper.

PIN (Lewis Ellies du), a very learned French writer, was born at Paris in 1657. In 1685 he undertook to publiſh an univerſal *bibliotheque* of all the eccleſiaſtical writers, containing the hiſtory of their lives, &c.; which vaſt deſign he accordingly accompliſhed. The freedom our author uſed in his judgements on the ſtyle, character, and doctrine of the eccleſiaſtical writers, having diſpleaſed ſome perſons, it was complained of to the archbiſhop of Paris, who publiſhed a decree or *ordonnance* againſt it. To this decree was annexed Mr du Pin's retractation; notwithſtanding which, his work was ſuppreſſed by an arret of parliament. However, he continued it under another title. His many different books ſhew his prodigious readineſs in compoſing. He was at the ſame time a divine, canoniſt, hiſtorian, critic, and philoſopher. At laſt being exhauſted by his labours, and by a regimen which contributed to ſhorten his days, he died in 1719.

PINDAR, the prince of lyric poets, was born at Thebes, about 520 years B. C. He received his firſt muſical inſtructions from his father, who was a flute-player by profeſſion; after which, according to Suidas, he was placed under Myrtis, a lady of diſtinguiſhed abilities in lyric poetry. It was during this period that he become acquainted with the poeteſs Corinna, who was likewiſe a ſtudent under Myrtis. Plutarch tells us, that Pindar profited from the leſſons which Corinna, more advanced in her ſtudies, gave him at this ſchool. It is very natural to ſuppoſe, that the firſt poetical effuſions of a genius ſo full of fire and imagination as that of Pindar would be wild and luxuriant; and Lucian has preſerved ſix verſes, ſaid to have been the exordium of his firſt eſſay; in which he crowded almoſt all the ſubjects for ſong which ancient hiſtory and mythology then furniſhed. Upon communicating this attempt to Corinna, ſhe told him, ſmiling, that he ſhould ſow with the hand, and not empty his whole ſack at once. Pindar, however, ſoon quitted the leading-ſtrings of theſe ladies, his poetical nurſes, and became the diſciple of Simonides, now arrived at extreme old age; after which he ſoon ſurpaſſed all his maſters, and acquired great reputation over all Greece: but, like a true prophet, he was leſs honoured in his own country than elſewhere; for at Thebes he was frequently pronounced to be vanquiſhed, in the muſical and poetical conteſts, by candidates of inferior merit.

The cuſtom of having theſe public trials of ſkill in all the great cities of Greece was now ſo prevalent, that but little fame was to be acquired by a muſician or poet, any other way than by entering the liſts; and we find, that both Myrtis and Corinna publicly diſputed the prize with him at Thebes. He obtained a victory over Myrtis, but was vanquiſhed five different times by Corinna. The judges, upon occaſions like theſe, have been frequently accuſed of partiality or ignorance, not only by the vanquiſhed, but by poſterity: and if the merit of Pindar was pronounced inferior to that of Corinna five ſeveral times, it was, ſays Pauſanias, becauſe the judges were more ſenſible to the charms of beauty than to thoſe of muſic and poetry (A). Was it not ſtrange, ſaid the Scythian Anacharſis, that the Grecian artiſts were never judged by artiſts, their peers?

Pindar, before he quitted Thebes, had the vexation to ſee his Dithyrambics traduced, abuſed, and turned into ridicule, by the comic poets of his time; and Athenæus tells us, that he was ſeverely cenſured by his brother lyrics, for being a lipogrammatiſt, and compoſing an ode from which he had excommunicated the letter S. Whether theſe cenſures proceeded from envy, or contempt, cannot now be determined; but they were certainly uſeful to Pindar, and it was neceſſary that he ſhould be laſhed for ſuch puerilities. Thebes ſeems to have been the *purgatory* of our young bard; when he quitted that city, as his judgment was matured, he avoided moſt of the errors for which he had been chaſtiſed, and ſuddenly became the wonder and delight of all Greece. Every hero, prince, and potentate, deſirous of laſting fame, courted the Muſe of Pindar.

He ſeems frequently to have been preſent at the four great feſtivals, of the Olympian, Pythian, Nemean, and Iſthmian games, as may be inferred from ſeveral circumſtances and expreſſions in the odes, which he compoſed for the victors in them all. Thoſe at Olympia, who were ambitious of having their atchievements celebrated by Pindar, applied to him for an ode, which was firſt ſung in the Prytaneum, or town-hall of Olympia, where there was a banqueting room, ſet apart for the entertainment of the conquerors. Here the ode was rehearſed by a chorus, accompanied by inſtruments. It was afterwards performed in the ſame manner at the triumphal entry of the victor into his own country, in proceſſions, or at the ſacrifices that were made with great pomp and ſolemnity on the occaſion.

Pindar, in his ſecond Iſthmian ode, has apologized for the mercenary cuſtom among poets, of receiving money for their compoſitions. "The world (ſays he) is grown intereſted, and thinks in general with the Spartan philoſopher Ariſtodemus, that *money only makes*

(A) Pauſanias ſays, that Corinna was one of the moſt beautiful women of her time, as he judged by a picture of her, which he ſaw at Tanagris, in the place where the public exerciſes were performed. She was repreſented with her head ornamented by a riband, as a memorial of the victories ſhe had obtained over Pindar at Thebes.

makes the man: a truth which this ſage himſelf experienced, having with his riches loſt all his friends." It is ſuppoſed that Pindar here alludes to the avarice of Simonides, who firſt allowed his muſe to ſell her favours to the higheſt bidder.

There is no great poet in antiquity, whoſe moral character has been leſs cenſured than that of Pindar. Plutarch has preſerved a ſingle verſe of his *Epicedium*, or *Dirge*, that was ſung at his funeral; which, ſhort and ſimple as it is, implies great praiſe: *This man was pleaſing to ſtrangers, and dear to his fellow-citizens.* His works abound with precepts of the pureſt morality: and it does not appear that he ever traduced even his enemies; comforting himſelf, for their malignity, by a maxim which he inſerted in his firſt *Pythic*, and which afterwards became proverbial, *That it is better to be envied than pitied.*

Pauſanias ſays, that the character of poet was truly conſecrated, in the perſon of Pindar, by the God of verſe himſelf, who was pleaſed, by an expreſs oracle, to order the inhabitants of Delphos to ſet apart, for Pindar, one half of the firſt-fruit offerings brought by the religious to his ſhrine, and to allow him a conſpicuous place in his temple; where, in an iron chair, he uſed to ſit and ſing his hymns in honour of that god. This chair was remaining in the time of Pauſanias, ſeveral centuries after, and ſhown to him as a relic not unworthy of the ſanctity and magnificence of that place.

But though Pindar's muſe was penſioned at Delphos, and well paid by princes and potentates elſewhere, ſhe ſeems, however, ſometimes to have ſung the ſpontaneous ſtrains of pure friendſhip. Of this kind were, probably, the verſes beſtowed upon the muſician Midas, of Agrigentum in Sicily, who had twice obtained the palm of victory by his performance on the flute at the Pythic games (B). It is in his 12th Pythic Ode, that Pindar celebrates the victory of Midas *over all Greece, upon that inſtrument which Minerva herſelf had invented* (C).

Fabricius tells us, that Pindar lived to the age of 90; and, according to the chronology of Dr Blair, he died 435 years B. C. aged 86. His fellow-citizens erected a monument to him in the Hippodrome at Thebes, which was ſtill ſubſiſting in the time of Pauſanias; and his renown was ſo great after his death, that his poſterity derived very conſiderable honours and privileges from it. When Alexander the Great attacked the city of Thebes, he gave expreſs orders to his ſoldiers to ſpare the houſe and family of Pindar. The Lacedæmonians had done the ſame before this period; for when they ravaged Bœotia and burned the capital, the following words were written upon the door of the poet: *Forbear to burn this houſe, it was the dwelling of Pindar.* Reſpect for the memory of this great poet continued ſo long, that, even in Plutarch's time, the beſt part of the ſacred victim at the Theoxenian feſtival was appropriated to his deſcendants.

PINDARIC ODE, in poetry, an ode formed in imitation of the manner of Pindar. See POETRY, n° 59.—61.

PINDUS, (anc. geog.), not a ſingle mountain, but a chain of mountains, inhabited by different people of Epirus and Theſſaly; ſeparating Macedonia, Theſſaly, and Epirus: An extenſive chain, having Macedonia to the north, the Perrhœbi to the weſt, the Dolopes to the ſouth, and the mountain itſelf of Theſſaly, (Strabo).

PINDUS, a Doric city of Ætolia, ſituate on the cognominal river, which falls into the Cephiſſus, (Strabo).

PINE, in botany. See PINUS.

PINE-*Apple*. See BROMELIA.

The method of raiſing pine-apples in this country by means of artificial heat has long been known: of late, however, ſome very conſiderable improvements have been made in this article. The leaves of the oak have been ſubſtituted to the more expenſive bark; and by treating the pines with them, they are found to thrive as well, and to produce as good fruit, as in the other method; and of the proper way of managing theſe leaves for the rearing of exotic plants, an account is given under the article OAK-*Leaves*. But the moſt conſiderable improvement is that mentioned in the 67th volume of the Philoſophical Tranſactions, where a method is ſhown by William Baſtard, eſq; of Devonſhire, of raiſing theſe fruits in water. His account of this method is as follows.

"Before I enter into the particulars of raiſing pine-apples in water, it will be neceſſary to tell you that my hot-houſe is covered with the beſt crown-glaſs, which I apprehend gives more heat than the common ſort of green glaſs generally uſed for hot-houſes. In the front part of the houſe, and indeed any where in the loweſt parts of it, the pine-apple plants will not thrive well in water. The way in which I treat them is as follows. I place a ſhelf near the higheſt part of the back wall, ſo that the pine-plants may ſtand without abſolutely touching the glaſs, but as near it as can be: on this ſhelf I place pans full of water, about ſeven or eight inches deep; and in theſe pans I put the pine-apple plants, growing in the ſame pots of earth as they are generally planted in to be plunged into the bark-bed in the common way; that is, I put the pot of earth, with the pine-plant in it, in the pan-full of water, and as the water decreaſes I conſtantly fill up the pan. I place either plants in fruit, or young plants as ſoon as they are well rooted, in theſe pans of water, and find they thrive equally well: the fruit reared this way is always much larger, as well as better flavoured, than when ripened in the bark-bed. I have more than once put only the plants themſelves without any earth, I mean after they had roots, into theſe pans of water, with only water ſufficient to keep the roots always covered, and found them flouriſh beyond expectation. In my houſe, the ſhelf I mention is ſupported by irons from the top, and there is an inter-

---

(B) This Midas is a very different perſonage from his long-eared majeſty of Phrygia, whoſe deciſion in favour of Pan had given ſuch offence to Apollo; as is manifeſt, indeed, from his having been cotemporary with Pindar.

(C) The moſt extraordinary part of this muſician's performance, that can be gathered from the ſcholiaſt upon Pindar, was his finiſhing the ſolo, without a reed or mouth-piece, which broke accidentally while he was playing. The legendary account given by the poet in this ode, of the occaſion upon which the flute was invented by Minerva, is diverting: "It was (ſays he) to imitate the howling of the Gorgons, and the hiſſing of their ſnakes, which the goddeſs had heard when the head of Meduſa (one of theſe three anti-graces) was cut off by Perſeus."

vening ſpace of about 10 inches between the back wall and the ſhelf. A neighbour of mine has placed a leaden ciſtern upon the top of the back flue, (in which, as it is in contact with the flue, the water is always warm when there is fire in the houſe), and finds his fruit excellent and large. My ſhelf does not touch the black flue, but is about a foot above it; and conſequently the water is only warmed by the air in the houſe. Both theſe methods do well. The way I account for this ſucceſs is, that the warm air always aſcending to the part where this ſhelf is placed, as being the higheſt part of the houſe, keeps it much hotter than in any other part. The temperature at that place is, I believe, ſeldom leſs than what is indicated by the 73d degree of Fahrenheit's thermometer, and when the ſun ſhines it is often at above 100: the water the plants grow in ſeems to enable them to bear the greateſt heat, if ſufficient air be allowed; and I often ſee the roots of the plants growing out of the holes in the bottom of the pot of earth, and ſhooting vigorouſly in the water.

"My hot-houſe (the dimenſions of which it may be proper to know) is 60 feet long, and 11 feet wide, the flues included; ſix feet high in the front, and 11 feet at the back of the inſide of the houſe. It is warmed by two fires. A leaden trough or ciſtern on the top of the back flue is preferable to my ſhelf, as in it the pine-plants grow much faſter in the winter, the water being always warmed by the flue: of this I have ſeen the great benefit theſe laſt two months in my neighbourhood. It is not foreign to this purpoſe to mention, that, as a perſon was moving a large pine-plant from the hot-bed in my houſe laſt ſummer, which plant was juſt ſhowing fruit, by ſome accident he broke off the plant juſt above the earth in which it grew, and there was no root whatever left to it: by way of experiment I took the plant, and fixed it upright in a pan of water (without any earth whatever) on the ſhelf; it there ſoon threw out roots, and bore a pine-apple that weighed upwards of two pounds."

PINEAL GLAND. See ANATOMY, n° 397, c.

PINGUICULA, BUTTERWORT; a genus of the monogynia order, belonging to the diandria claſs of plants. There are four ſpecies; of which the moſt remarkable is the vulgaris, or common butterwort, growing commonly on bogs or low moiſt grounds, in England and Scotland. Its leaves are covered with ſoft, upright pellucid prickles, ſecreting a glutinous liquor. The flowers are pale red, purple, or deep violet colour, and hairy within. If the freſh-gathered leaves of this plant are put into the ſtrainer through which warm milk from the cow is poured, and the milk ſet by for a day or two to become aceſcent, it acquires a conſiſtency and tenacity, and neither whey nor cream ſeparate from it. In this ſtate it is an extremely grateful food, and as ſuch is uſed by the inhabitants of the north of Sweden. There is no further occaſion to have recourſe to the leaves; for half a ſpoonful of this prepared milk, mixed with freſh warm milk, will convert it to its own nature, and this again will change another quantity of freſh milk, and ſo on without end. The juice of the leaves kills lice; and the common people uſe it to cure the cracks or chops in cows udders. The plant is generally ſuppoſed injurious to ſheep, by occaſioning in them that diſeaſe called the *rot*. But from experiments mode on purpoſe, and conducted with accuracy, it appears, that neither ſheep, cows, goats, horſes, or ſwine, will feed upon this plant.

PINION, in mechanics, an arbor, or ſpindle, in the body whereof are ſeveral notches, which catch the teeth of a wheel that ſerves to turn it round, or it is a leſſer wheel that plays in the teeth of a larger.

PINK, a name given to a ſhip with a very narrow ſtern; whence all veſſels, however ſmall, whoſe ſterns are faſhioned in this manner, are called *pink-ſterned*.

PINK, in botany. See DIANTHUS.

Plate CCXLIII. fig. 2.

PINNA, in zoology, a genus belonging to the order of vermes teſtacea. The animal is a ſlug. The ſhell is bivalve, fragile, and furniſhed with a beard; gapes at one end; the valves hinge without a tooth. The largeſt and moſt remarkable ſpecies inhabits the Mediterranean. It is blind, as are all of the genus; but furniſhed with very ſtrong calcareous valves. The ſcuttle-fiſh (*Sepia*), an inhabitant of the ſame ſea, is a deadly foe to this animal: As ſoon as the pinna opens its ſhell, he ruſhes upon her like a lion; and would always devour her, but for another animal whom ſhe protects within her ſhell, and from whom in return ſhe receives very important ſervices. It is an animal of the crab kind, (ſee CANCER, n° 15.), naked like the hermit, and very quick-ſighted. This cancer or crab the pinna receives into her covering; and when ſhe opens her valves in queſt of food, lets him out to look for prey. During this the ſcuttle-fiſh approaches; the crab returns with the utmoſt ſpeed and anxiety to his hoſteſs, who being thus warned of the danger ſhuts her doors, and keeps out the enemy. That very ſagacious obſerver Dr Haſſelquiſt, in his voyage towards Paleſtine, beheld this curious phenomenon, which tho' well known to the ancients had eſcaped the moderns. Ariſtotle (*Hiſt.* lib. 5. c. 15.) relates, that the pinna kept a guard to watch for her: That there grew to the mouth of the pinna a ſmall animal, having claws, and ſerving as a caterer, which was like a crab, and was called the *pinnophylax*. Pliny (lib. 9. 51.) ſays, The ſmalleſt of all the kinds is called the *pinnoteres*, and therefore liable to injury; this has the prudence to hide itſelf in the ſhells of oyſters. Again, lib. 9. 66. he ſays, The pinna is of the genus of ſhell-fiſh; it is produced in muddy waters, always erect, nor ever without a companion, which ſome call the *pinnoteres*, others the *pinnophylax*. This ſometimes is a ſmall ſquill, ſometimes a crab, that follows the pinna for the ſake of food. The pinna is blind; and when, upon opening its ſhell, it expoſes itſelf as a prey to the ſmalleſt kind of fiſhes, theſe immediately aſſault her, and growing bolder upon finding no reſiſtance venture in. The guard watching its time gives notice by a bite; upon which the pinna, cloſing its ſhell, ſhuts in, kills, and gives part of whatever happens to be there to its companion.

> The pinna and the crab together dwell,
> For mutual ſuccour, in one common ſhell.
> They both to gain a livelihood combine;
> That takes the prey, when this has given the ſign.
> From hence this crab, above his fellows fam'd,
> By ancient Greeks was *pinnoteres* nam'd.
>
> OPPIAN.

PINNACE, a ſmall veſſel navigated with oars and ſails, and having generally two maſts, which are rigged like thoſe of a ſchooner.

Pinnace, is alſo a boat uſually rowed with eight oars. See the article Boat.

PINNACLE, in architecture, the top or roof of an houſe, terminating in a point. This kind of roof among the ancients, was appropriated to temples; their ordinary roofs were all flat, or made in the platform way.

PINNATED leaves, in botany. See Botany, p. 1296. col. 2. n° 59.

PINT, *(pinta)*, a veſſel, or meaſure, uſed in eſtimating the quantity of liquids, and even ſometimes of dry things.—Budæus derives the word from the Greek ϖινθα; others from the German *pint*, a little meaſure of wine; Nicod from the Greek ϖινειν, "to drink."

The *Engliſh pint* is twofold; the one for wine-meaſure, the other for beer and ale-meaſure. See Measure.—Two pints make a quart, two quarts a pottle, two pottles a gallon, &c. See Gallon, Quart, &c.

The *Scots pint* was formerly regulated by a ſtandard jug of caſt metal, the cuſtody of which was committed to the borough of Stirling. This jug was ſuppoſed to contain 105 cubic inches; and though after ſeveral careful trials it has been found at a medium to contain only about 103½ inches, yet, in compliance with eſtabliſhed cuſtom, founded on that opinion, the pint-ſtoups are ſtill regulated to contain 105 inches.—It was enacted by James I. of Scotland, that the pint ſhould contain 41 ounces Trone-weight of the clear water of Tay, and by James VI. that it ſhould contain 55 Scots Troy-ounces of the clear water of Leith. This affords another method of regulating the pint, and alſo aſcertains the ancient ſtandard of the Trone-weight. As the water of Tay and Leith are alike, the Trone-weight muſt have been to the Scots Troy-weight as 55 to 41; and therefore the pound Trone muſt have contained about 21½ ounces Scots Troy. See Trone.—The Scots pint contains two chopins, the chopin two mutchkins, and the mutchkin four gills.—Two pints make a quart, and four pints a Scots gallon.

PINTADA, a ſpecies of Procellaria.

PINTLES, certain pints or hooks, faſtened upon the back part of the rudder, with their points downwards, in order to enter into, and reſt upon, the *googings*, fixed in the ſtern-poſt, to hang the rudder. See Helm.

PINTURICCIO (Bernardino), a celebrated Italian painter, born at Peruſia in 1454. He was the diſciple of Peter Perugino, under whom he became ſo good an artiſt, that he employed him on many occaſions as his aſſiſtant. He principally painted hiſtory and groteſque; but he alſo excelled in portraits, among which thoſe of pope Pius II. and Innocent VIII. of Giulia Farneſe, Cæſar Borgia, and queen Iſabella of Spain, are particularly diſtinguiſhed. The moſt memorable performance of Pinturiccio is the hiſtory of Pius II. painted in ten compartments in the hiſtory of Siena; in which undertaking, Raphael, then a young man, and bred under the ſame maſter, aſſiſted him ſo far as to ſketch out cartoons of many parts of the compoſition. The ſtory of his death is worth relating, eſpecially as it illuſtrates his character. The laſt work he was engaged in was a *Nativity* for the monaſtery of St Francis at Siena: the monks accommodated him with a chamber to work in, which they cleared of all the furniture, except one old trunk or cheſt that appeared too rotten to move; but Pinturiccio, naturally poſitive and peeviſh, inſiſting on its being taken away, the monks, willing to gratify him, complied. It was no ſooner ſtirred than one of the planks burſting, out tumbled 500 pieces of gold, which had been ſecreted there for many years. The monks were overjoyed at finding this treaſure, and the painter proportionably mortified at loſing his chance of the diſcovery by his indiſcreet obſtinacy: it affected his ſpirits ſo much that he ſurvived but a few months, and it was generally looked on as the cauſe of his death.

PINUS, the Pine-tree; a genus of the monadelphia order, belonging to the monœcia claſs of plants. There are 14 ſpecies; of which the moſt remarkable are, 1. The pinea, pineaſter, or wild pine, grows naturally on the mountains in Italy and the ſouth of France. This grows to the ſize of a large tree; the branches extend to a conſiderable diſtance; and while the trees are young, they are fully garniſhed with leaves, eſpecially where they are not ſo cloſe as to exclude the air from thoſe within; but as they advance in age, the branches appear naked, and all thoſe which are ſituated below become unſightly in a few years, for which reaſon they are now much leſs in eſteem than formerly. 2. The rubra, commonly called the *Scots fir* or *pine*. It is common throughout Scotland, whence its name; though it is alſo found in moſt of the other countries of Europe. M. du Hamel, of the Royal Academy of Sciences, mentions his having received ſome ſeeds of it from St Domingo in the Weſt Indies; and thence concludes, that it grows indifferently in the temperate, frigid, and torrid zones. The wood of this tree is the red or yellow deal, which is the moſt durable of any of the kinds yet known. The leaves of this tree are much ſhorter and broader than thoſe of the former ſort, of a greyiſh colour, growing two out of one ſheath; the cones are ſmall, pyramidal, and end in narrow points; they are of a light colour, and the ſeeds are ſmall. 3. The ſtrobus, Lord Weymouth's pine, or North American white pine. This grows ſometimes to the height of 100 feet and upwards, and is highly valued on account of its beauty. The bark of the tree is very ſmooth and delicate, eſpecially when young; the leaves are long and ſlender, five growing out of one ſheath; the branches are pretty cloſely garniſhed with them, and thus make a fine appearance. The cones are long, ſlender, and very looſe, opening with the firſt warmth of the ſpring; ſo that if they are not gathered in winter, the ſcales open and let out the ſeeds. The wood of this ſort is eſteemed for making maſts for ſhips. In Queen Anne's time there was a law made for the preſervation of theſe trees, and for the encouragement of their growth in America. Within theſe laſt 50 years they have been propagated in Britain in conſiderable plenty.

Culture. All the ſorts of pines are propagated by ſeeds produced in hard woody cones. The way to get the ſeeds out of theſe cones is to lay them before a gentle fire, which will cauſe the cells to open, and then the ſeeds may be eaſily taken out. If the cones are kept entire, the ſeeds will remain good for ſome years; ſo that the ſureſt way of preſerving them is to let them remain in the cones till the time for ſowing the ſeeds. If the cones are kept in a warm place in ſummer, they will open and emit the ſeeds; but if they are not expoſed to the heat, they will remain cloſe for a long time. The beſt ſeaſon for ſowing the pines is about the end of March. When the ſeeds are ſown, the place ſhould be covered with nets to keep off the birds; otherwiſe, when the plants begin to appear with the huſk of the ſeed on the top of them, the birds will peck off the tops, and thus deſtroy them.

Uſes. From the firſt ſpecies is extracted the common turpentine, much uſed by farriers, and from which is drawn the oil of that name. A decoction of the nuts or ſeeds of this ſpecies in milk, or of the extremities of the branches pulled in ſpring, is ſaid, with a proper regimen, to cure the moſt inveterate ſcurvy. The wood of this ſpecies is not valued; but that of the Scots pine is ſuperior to any of the reſt. It is obſervable of the Scots pine, that when planted in bogs, or in a moiſt ſoil, though the plants make great progreſs, yet the wood is white, ſoft, and little eſteemed; but when planted in a dry ſoil, tho' the growth of the trees is there very ſlow, yet the wood is proportionably better. Few trees have been applied to more uſes than this. The talleſt and ſtraighteſt are formed by nature for maſts to our navy. The timber is reſinous, durable, and applicable to numberleſs domeſtic purpoſes, ſuch as flooring and wainſcotting of rooms, making of beds, cheſts, tables, boxes, &c. From the trunk and branches of this, as well as moſt others of the pine tribe, tar and pitch is obtained. By inciſion, barras, Burgundy pitch, and turpentine, are acquired and prepared. The reſinous roots are dug out of the ground in many parts of the Highlands, and, being divided into ſmall ſplinters, are uſed by the inhabitants to burn inſtead of candles. At Loch-Broom, in Roſsſhire, the fiſhermen make ropes of the inner bark; but hard neceſſity has taught the inhabitants of Sweden, Lapland, and Kamſchatka, to convert the ſame into bread. To effect this, they, in the Spring ſeaſon, make choice of the talleſt and faireſt trees; then ſtripping off carefully the outer bark, they collect the ſoft, white, ſucculent interior bark, and dry it in the ſhade. When they have occaſion to uſe it, they firſt toaſt it at the fire, then grind, and, after ſteeping the flour in warm water to take off the reſinous taſte, they make it into thin cakes, which are baked for uſe. On this ſtrange food the poor inhabitants are ſometimes conſtrained to live for a whole year; and, we are told, through cuſtom, become at laſt even fond of it. Linnæus remarks, that this ſame bark-bread will fatten ſwine; and humanity obliges us to wiſh, that men might never be reduced to the neceſſity of robbing them of ſuch a food. The interior bark, of which the abovementioned bread is made, the Swediſh boys frequently peel off the trees in the ſpring, and eat raw with greedy appetite. From the cones of this tree is prepared a diuretic oil, like the oil of turpentine, and a reſinous extract, which has ſimilar virtues with the balſam of Peru. An infuſion or tea of the buds is highly commended as an antiſcorbutic. The farina, or yellow powder, of the male-flowers, is ſometimes in the ſpring carried away by the winds, in ſuch quantities, where the trees abound, as to alarm the ignorant with the notion of its raining brimſtone. The tree lives to a great age; Linnæus affirms, to 400 years.

PIONEERS, in the art of war, are ſuch as are commanded in from the country, to march with an army for mending the ways, for working on intrenchments and fortifications, and for making mines and approaches. The ſoldiers are likewiſe employed in all theſe things.—Moſt of the foreign regiments of artillery have half a company of pioneers, well inſtructed in that important branch of duty. Our regiments of infantry and cavalry have three or four pioneers well inſtructed in that important branch of duty. Our regiments of infantry and cavalry have three or four pioneers each, provided with aprons, hatchets, ſaws, ſpades, and pick-axes. Each pioneer muſt have an ax, a ſaw, and an apron; a cap with a leather crown, and a black bears-ſkin front, on which is to be the king's creſt in white, on a red ground; alſo an ax and a ſaw. The number of the regiment to be on the back part of the cap.

PIP, or **Pep**, a diſeaſe among poultry, conſiſting of a white thin ſkin, or film, that grows under the tip of the tongue, and hinders their feeding. It uſually ariſes from want of water, or from the drinking puddle-water, or eating filthy meat. It is cured by pulling off the film with the fingers, and rubbing the tongue with ſalt. Hawks are particularly liable to this diſeaſe, eſpecially from feeding on ſtinking fleſh.

PIPE, in building, &c. a canal, or conduit, for the conveyance of water and other liquids. Pipes for water, water-engines, &c. are uſually of lead, iron, earth, or wood: the latter are uſually made of oak or elder. Thoſe of iron are caſt in forges; their uſual length is about two feet and a half: ſeveral of theſe are commonly faſtened together by means of four ſcrews at each end, with leather or old hat between them, to ſtop the water. Thoſe of earth are made by the potters; theſe are fitted into one another, one end being always made wider than the other. To join them the cloſer, and prevent their breaking, they are covered with tow and pitch: their length is uſually about that of the iron pipes. The wooden pipes are trees bored with large iron augres, of different ſizes, beginning with a leſs, and then proceeding with a larger ſucceſſively; the firſt being pointed, the reſt being formed like ſpoons, increaſing in diameter, from one to ſix inches or more: they are fitted into the extremities of each other (as repreſented fig. 5.), and are ſold by the foot.

Plate CCXLI

Wooden pipes are bored as follows. The machine repreſented fig. 4. is put in motion by the wheel A, which is moved by a current of water; upon the axle of this wheel, is a cog-wheel B, which cauſes the lanterns C, D, to turn horizontally, whoſe common axis is conſequently in a perpendicular direction. The lantern D turns at the ſame time two cog-wheels, E and F: the firſt, E, which is vertical, turns the augre which bores the wood; and the ſecond, F, which is horizontal, cauſes the carriage bearing the piece to advance by means of the arms H, I, which takes hold of the notches in the wheel K. The firſt,

H,

H, by means of the notches, draws the wheel towards F; and the other, I, puſhes the under-poſt of the wheel in an oppoſite direction; both which motions tend to draw the carriage towards F, and conſequently cauſe the augre to pierce the wood. The augre being from 9 to 12 feet in length, and of a proportionable bigneſs, it will be neceſſary to have two pieces, as L, L, to ſupport its weight, and cauſe it to enter the piece to be bored with the ſame uniformity.

For the conſtruction of leaden pipes, ſee the article Plumbery.

Air-Pipes. See Air-*Pipes*.

Pipes *of an Organ*. See Organ.

Bag-Pipe. See Bag-*Pipe*.

Tobacco-Pipe, a machine uſed in the ſmoking of tobacco, conſiſting of a long tube, made of earth or clay, having at one end a little caſe, or furnace, called the *bowl*, for the reception of the tobacco, the fumes whereof are drawn by the mouth through the other end. Tobacco-pipes are made of various faſhions; long, ſhort, plain, worked, white, varniſhed, unvarniſhed, and of various colours, &c. The Turks uſe pipes three or four feet long, made of ruſhes, or of wood bored, at the end whereof they fix a kind of a pot of baked earth, which ſerves as a bowl, and which they take off after ſmoking.

Pipe, alſo denotes a veſſel or meaſure for wine, and things meaſured by wine-meaſure. See the article Measure.

Pipe, in mining, is where the ore runs forwards endwiſe in a hole, and doth not ſink downwards or in a vein.

Pipe, *Pipa*, in law, is a roll in the exchequer, called alſo the *great roll*. See the next article.

Pipe-*Office*, is an office wherein a perſon called the *clerk of the pipe*, makes out leaſes of crown-lands, by warrant from the lord-treaſurer, or commiſſioners of the treaſury, or chancellor of the exchequer. The clerk of the pipe makes out alſo all accounts of ſheriffs, &c. and gives the accountants their *quietus eſt*. To this office are brought all accounts which paſs the remembrancer's office, and remain there, that if any ſtated debt be due from any perſon, the ſame may be drawn down into the great roll of the pipe: upon which the comptroller iſſues out a writ, called the *ſummons of the pipe*, for recovery thereof; and if there be no goods or chattels, the clerk then draws down the debts to the lord treaſurer's remembrancer, to write eſtreats againſt their lands. All tallies which vouch the payment of any ſum contained in ſuch accounts, are examined and allowed by the chief ſecondary of the pipe. Beſides the chief clerk in this office, there are eight attorneys, or ſworn clerks, and a comptroller.

Pipe-*Fiſh*, in ichthyology. See Syngnathus.

PIPER, in ichthyology. See Trigla.

Piper, *Pepper*; a genus of the trigynia order, belonging to the diandria claſs of plants. There are 20 ſpecies, of which the moſt remarkable is the ſiriboa, with oval, heart-ſhaped, nerved leaves, and reflexed ſpikes. This is the plant which produces the pepper ſo much uſed in food. It is a ſhrub whoſe root is ſmall, fibrous, and flexible; it riſes into a ſtem, which requires a tree or a prop to ſupport it. Its wood has the ſame ſort of knots as the vine; and when it is dry, it exactly reſembles the vine-branch. The leaves, which have a ſtrong ſmell and a pungent taſte, are of an oval ſhape; but they diminiſh towards the extremity, and terminate in a point. From the flower-buds, which are white, and are ſometimes placed in the middle and ſometimes at the extremity of the branches, are produced ſmall berries reſembling thoſe of the curant-tree. Each of theſe contains between 20 and 30 corns of pepper; they are commonly gathered in October, and expoſed to the ſun ſeven or eight days. The fruit, which was green at firſt, and afterwards red, when ſtripped of its covering aſſumes the appearance it has when we ſee it. The largeſt, heavieſt, and leaſt ſhrivelled, is the beſt.

The pepper-plant flouriſhes in the iſlands of Java, Sumatra, and Ceylon, and more particularly on the Malabar coaſt. It is not ſown, but planted; and great nicety is required in the choice of the ſhoots. It produces no fruit till the end of three years; but bears ſo plentifully the three ſucceeding years, that ſome plants yield between ſix and ſeven pounds of pepper. The bark then begins to ſhrink; and the ſhrub declines ſo faſt, that in 12 years time it ceaſes bearing.

The culture of pepper is not difficult: it is ſufficient to plant it in a rich ſoil, and carefully to pull up the weeds that grow in great abundance round its roots, eſpecially the three firſt years. As the ſun is highly neceſſary to the growth of the pepper-plant, when it is ready to bear, the trees that ſupport it muſt be lopped to prevent their ſhade from injuring the fruit. When the ſeaſon is over, it is proper to crop the head of the plant. Without this precaution, there would be too much wood, and little fruit.

The pepper exported from Malabar, which was formerly entirely in the hands of the Portugueſe, and is at preſent divided between the Dutch, Britiſh, and French, amounts to about 10,000,000 weight.

PIRÆEUS portus, (anc. geog.), a celebrated port to the weſt of Athens, conſiſting naturally of three harbours or baſons, (Thucydides); which lay neglected, till Themiſtocles put the Athenians on making it a commodious port, (Nepos); the Phalerus a ſmall port, and not far from the city, being what they uſed before that time, (Pauſanias, Nepos). Piræeus was originally a village of Attica, (Pauſanias); an iſland, (Strabo); and though diſtant 40 ſtadia from Athens, was joined to it by two long walls, (Thucydides), and itſelf locked or walled round, (Nepos): A very commodious and ſafe harbour. The whole of its compaſs was 60 ſtadia, including the Munichia. Not far from the Piræeus, ſtood the ſepulchre of Themiſtocles; whither his friends conveyed his bones from Magneſia, into the Hither Aſia, (Cicero, Plutarch, Pauſanias). It is ſtill at this day a famous port, much frequented, and called *Porto Lione*.

PIRACY, the crime of robbery and depredation upon the high ſeas.

By the ancient common law, piracy, if committed by a ſubject, was held to be a ſpecies of treaſon, being contrary to his natural allegiance; and by an alien, to be felony only: but now, ſince the ſtatute of treaſons, 25 Edw. III. c. 2. it is held to be only felony in a ſubject. Formerly is was only cognizable by the admiralty courts, which proceed by the rules of the civil law. But, it being inconſiſtent with the liberties of the nation, that any man's life ſhould be taken away, unleſs by the judgment of his peers, or the common law of the land, the ſtatute 28 Hen. VIII. c. 15. eſtabliſhed a new juriſdiction for this purpoſe; which proceeds according to the courſe of the common law.

The offence of piracy, by common law, conſiſts in committing thoſe acts of robbery and depredation upon the high ſeas, which, if committed upon land, would have amounted to felony there. But, by ſtatute, ſome other offences are made piracy alſo: as, by ſtatute 11 & 12 W. III. c. 7. if any natural born ſubject commits any act of hoſtility upon the high ſeas, againſt others of his majeſty's ſubjects, under colour of a commiſſion from any foreign power; this, though it would only be an act of war in an alien, ſhall be conſtrued piracy in a ſubject. And farther, any commander, or other ſeafaring perſon, betraying his truſt, and running away with any ſhip, boat, ordnance, ammunition, or goods; or yielding them up voluntarily to a pirate; or conſpiring to do theſe acts; or any perſon aſſaulting the commander of a veſſel, to hinder him from fighting in defence of his ſhip; or confining him, or cauſing or endeavouring to cauſe a revolt on board; ſhall, for each of theſe offences, be adjudged a pirate, felon, and robber, and ſhall ſuffer death, whether he be principal, or merely acceſſory by ſetting forth ſuch pirates, or abetting them before the fact, or receiving or concealing them or their goods after it. And the ſtatute 4 Geo. I. c. 11. expreſsly excludes the principals from the benefit of clergy. By the ſtatute 8 Geo. I. c. 24. the trading with known pirates, or furniſhing them with ammunition, or fitting out any veſſel for that purpoſe, or in any wiſe conſulting, combining, confederating, or correſponding with them; or the forcibly boarding any merchant veſſel, though without ſeizing or carrying her off, and deſtroying or throwing any of the goods overboard; ſhall be deemed piracy: and ſuch acceſſories to piracy as are deſcribed by the ſtatute of king William are declared to be principal pirates, and all pirates convicted by virtue of this act are made felons without benefit of clergy. By the ſame ſtatutes alſo, (to encourage the defence of merchant veſſels againſt pirates), the commanders or ſeamen wounded, and the widows of ſuch ſeamen as are ſlain, in any piratical engagement, ſhall be entitled to a bounty to be divided among them, not exceeding one fiftieth part of the value of the cargo on board: and ſuch wounded ſeamen ſhall be entitled to the penſion of Greenwich hoſpital; which no other ſeamen are, except only ſuch as have ſerved in a ſhip of war. And if the commander ſhall behave cowardly, by not defending the ſhip, if ſhe carries guns or arms; or ſhall diſcharge the mariners from fighting, ſo that the ſhip falls into the hands of pirates; ſuch commander ſhall forfeit all his wages, and ſuffer ſix months impriſonment. Laſtly, by ſtatute 18 Geo. II. c. 30. any natural born ſubject or denizen, who in time of war ſhall commit hoſtilities at ſea againſt any of his fellow-ſubjects, or ſhall aſſiſt an enemy on that element, is liable to be tried and convicted as a pirate.

PIRATE, (ϖειρατης, Gr.); a ſea robber, or an armed ſhip that roams the ſeas without any legal commiſſion, and ſeizes or plunders every veſſel ſhe meets indiſcriminately, whether friends or enemies.

The colours uſually diſplayed by pirates are ſaid to be a black field, with a death's head, a battle-axe, and hour-glaſs. The laſt inſtrument is generally ſuppoſed to determine the time allowed to the priſoners, whom they take, to conſider whether they will join the pirates in their felonious combination, or be put to death, which is often perpetrated in the moſt cruel manner.

Amongſt the moſt celebrated pirates of the north is recorded Alvilda, daughter of a king of the Goths named *Sypardus*. She embraced this occupation to deliver herſelf from the violence impoſed on her inclination, by a marriage with Alf, ſon of Sigarus king of Denmark. She dreſſed herſelf as a man; and compoſed her band of rowers, and the reſt of her crew, of a number of young women attired in the ſame manner. Amongſt the firſt of her cruizes, ſhe touched at a place where a company of pirates bewailed the death of their captain. The ſtrangers were captivated with the agreeable manners of Alvilda, and choſe her for their chief. By this reinforcement ſhe became ſo formidable upon the ſea, that prince Alf came to engage her. She ſuſtained his attacks for a conſiderable time: but, in a vigorous action, Alf boarded her veſſel, and having killed the greateſt part of her crew, ſeized the captain, namely herſelf; whom nevertheleſs he knew not, becauſe the princeſs had a caſque which covered her viſage. Being maſter of her perſon, he removed the caſque; and in ſpite of her diſguiſe, inſtantly recognized her, and offered her his hand in wedlock.

PIRENE, (Pliny); a fountain ſacred to the muſes, ſpringing below the top of the Acrocorinthus, a high and ſteep mountain which hangs over Corinth. Its waters were agreeable to drink, (Pauſanias); extremely clear, (Strabo); very light (Athenaeus), and pale (Perſius): having relation either to the grief of Pirene, mother of Cenchrea, from whoſe tears this fountain aroſe, (Pauſanias); or to the paleneſs brought on by the too eager purſuits of the muſes.

PISA, a large town of Tuſcany in Italy, ſituated on the river Arno, 52 miles from Florence. It was a famous republic, till ſubdued, firſt by the duke of Milan, and then by the Florentines in the year 1406. Before it loſt its freedom, it is ſaid to have contained near 150,00 inhabitants, but now it has not above 16,000 or 17,000. Its territory is very fruitful; abounding in corn, wine, and fruit, and fine cattle. The houſes are well built, and the ſtreets even, broad, and well paved; but in many places over-run with graſs. The univerſity is well endowed, and has able profeſſors, but is not in a very flouriſhing condition. The exchange is a ſtately ſtructure, but little frequented. The great duke's galleys are built, and commonly ſtationed here. This city is alſo the principal reſidence of the order of St Stephen, and the ſee of an archbiſhop. The cathedral, a large Gothic pile, contains a great number of excellent paintings and other curioſities. The echo of the Baptiſtery is ſaid to exceed that near Milan, though the repetitions are not quite ſo diſtinct. Hard by the cathedral is the city burying ground, called *Il Campo Santo*; and in that the famous leaning tower, the inclination of which is ſo great, that a plumb-line let down from the top touches the ground at the diſtance of near 15 feet from the bottom. In the church della Spina, they pretend to have one of the thorns of the crown that was placed on our Saviour's head. The city for its defence has a moat, walls, a caſtle, fort, and citadel; the laſt of which is a modern work. The Arno is of a conſiderable breadth here, and has three bridges over it, one of them of marble: two leagues below the town, it falls into the ſea. The phyſic-garden is very ſpacious, contains a great number of plants, and is decorated with water-works: over the door leading into it are theſe words, *Hic Argus ſed non Briareus eſto;* i.e. Employ the eye of Argus, but not the hands of Briareus. The air is ſaid to be unwholſome here in ſummer, on account of the neighbouring moraſſes. Many buffaloes are bred in the neighbouring country, and their fleſh commonly eaten. A canal runs from this city to Leghorn; and between it and Lucca are hot baths.

PISCARY, in our ancient ſtatutes, the liberty of fiſhing in another man's waters.

PISCES, in aſtronomy, the 12th ſign or conſtellation of the zodiac.

PISCIDIA, a genus of the decandria order, belonging the diadelphia claſs of plants. There are two two ſpecies, *viz.* 1. The erythrina, or dog-wood tree. This grows plentifully in Jamaica, where it riſes to the height of 25 feet or more; the ſtem is almoſt as large as a man's body, covered with a light-coloured ſmooth bark, and ſending out ſeveral branches at the top without order; the leaves are about two inches long, winged, with oval lobes. The flowers are of the butterfly kind, and of a dirty white colour; they are ſucceeded by oblong pods, with four longitudinal wings, and jointed between the cells which contain the ſeeds. 2. The Carthaginienſis, with oblong oval leaves, is alſo a native of the Weſt Indies. It differs from the former only in the ſhape and conſiſtence of the leaves, which are more oblong and ſtiffer than the former; but in other reſpects they are very ſimilar. Both ſpecies are eaſily propagated by ſeeds; but require artificial heat to preſerve them in this country.—The negroes in the Weſt Indies make uſe of the bark of the firſt ſpecies to intoxicate fiſh. When any number of gentlemen have an inclination to divert themſelves with fiſhing, or, more properly ſpeaking, with fiſh-hunting, they ſend each of them a negro-ſlave to the woods, in order to fetch ſome of the bark of the dog-wood tree. This bark is next morning pounded very ſmall with ſtones, put into old ſacks, carried into rocky parts of the ſea, ſteeped till throughly ſoaked with ſalt-water, and then well ſqueezed by the negroes to expreſs the juice. This juice immediately colours the ſea with a reddiſh hue; and, being of a poiſonous nature, will in an hour's time make the fiſhes, ſuch as groopers, rock-fiſh, old wives, Welchmen, &c. ſo drunk or intoxicated, as to ſwim on the ſurface of the water, quite heedleſs of the danger: the gentlemen then ſend in their negroes, who purſue, both ſwimming and diving, the poor inebriated fiſhes, till they catch them with their hands; their maſters mean time ſtanding by, on high rocks, to ſee the paſtime.

It is remarkable, that though this poiſon kills millions of the ſmall fry, it has never been known to impart any bad quality to the fiſh which have been caught in conſequence of the intoxication.

The wood of this tree, although pretty hard, is only fit for fuel; and even for this purpoſe the negroes very ſeldom, if ever, employ it, on account of its ſingular quality juſt mentioned. The bark is rough, brown, and thick; the tree ſends forth a conſiderable number of branches, and is well cloathed with leaves, which reſemble thoſe of the pea, are thick, cottony, and of a deep green. The bark uſed for the above-mentioned purpoſe is chiefly that of the roots.

PISCINA, in antiquity, a large baſon in a public place or ſquare, where the Roman youth learned to ſwim; and which was ſurrounded with a high wall, to prevent filth from being thrown into it.—This word is alſo uſed for a lavatory among the Turks, placed in the middle court of a moſque or temple, where the Muſſulmen waſh themſelves before they offer their prayers.

PISISTRATUS, a famous general of the Athenians. He uſurped the ſupreme power, and, in order to obtain it, was a cruel tyrant; but having gained it, he became a wiſe legiſlator, and an excellent governor. He died 327 B.C.

PISSAPHALTUM, EARTH-PITCH; a fluid, opaque, mineral body, of a thick conſiſtence, ſtrong ſmell, readily inflammable, but leaving a reſiduum of greyiſh aſhes after burning. It ariſes out of the cracks of the rocks, in ſeveral places in the iſland of Sumatra, and ſome other places in the Eaſt Indies, where it is much eſteemed in paralytic diſorders.

PISSELÆUM INDICUM, *Barbadoes Tar;* a mineral fluid, of the nature of the thicker bitumens, and of all others the moſt approaching, in appearance, colour, and conſiſtence, to the true piſſaphaltum, but differing from it in other reſpects. It is very frequent in many parts of America, where it is found trickling down the ſides of mountains in large quantities, and ſometimes floating on the ſurface of the waters. It has been greatly recommended internally in coughs, and other diſorders of the breaſt and lungs.

PISTACIA, TURPENTINE-TREE, *Piſtachia-nut* and *Maſtic tree;* a genus of the pentandria order, belonging to the dioecia claſs of plants. There are nine ſpecies; of which the moſt remarkable are, 1. The terebinthus, or piſtachia-tree. This grows naturally in Arabia, Perſia, and Syria, whence the nuts are annually brought to Europe. In thoſe countries it grows to the height of 25 or 30 feet; the bark of the ſtem and old branches is of a dark ruſſet colour, but that of the young branches is of a light brown. Theſe are garniſhed with winged leaves, compoſed ſometimes of two, at other times of three pair of lobes, terminated by an odd one: theſe lobes approach towards an oval ſhape, and their edges are turned backward; and theſe, when bruiſed, emit a ſmell ſimilar to that of the ſhell of the nut. Some of theſe trees produce male, and others female flowers, and ſome have both male and female on the ſame tree. The male flowers come out from the ſides of the branches, in looſe bunches or catkins. They have no petals, but five ſmall ſtamina crowned by large four-cornered ſummits filled with farina; and when this is diſcharged, the flowers fall off. The female flowers come out in cluſters from the ſides of the branches: they have no petals, but a large oval germen ſupporting three reflexed ſtyles, and are ſucceeded by oval nuts. 2. The lentiſcus, or common maſtic-tree, grows naturally in Portugal, Spain, and Italy. Being an evergreen, it has been preſerved in this country in order to adorn the green-houſes. In the countries where it is a native, it riſes to the height of 18 or 20 feet, covered with a grey bark on the ſtem; but the branches, which are very numerous, are covered with a reddiſh-brown bark, and are garniſhed with winged leaves, compoſed of three or four pair of ſmall ſpear-ſhaped lobes, without an odd one at the end. 3. The orientalis, or true maſtic-tree of the Levant, from which the maſtic is gathered, has been confounded by moſt botanical writers with the lentiſcus, or common maſtic-tree, above deſcribed, though there are conſiderable differences between them. The bark of the tree is brown; the leaves are compoſed of two or three pair of ſpear-ſhaped lobes, terminated by an odd one: the outer lobes are the largeſt; the others gradually diminiſh, the innermoſt being the leaſt. Theſe turn of a browniſh colour towards the autumn, when the plants are expoſed to the open air; but if they are under glaſſes, they keep green. The leaves continue all the year; but are not ſo thick as thoſe of the common ſort, nor are the plants ſo hardy.

Culture. The firſt ſpecies is propagated by its nuts; which ſhould be planted in pots filled with light kitchen-garden earth, and plunged into a moderate hot-bed to bring up the plants: when theſe appear, they ſhould have a large ſhare of air admitted to them, and by degrees they ſhould be expoſed to the open air, which at laſt they will bear in all ſeaſons, though not without great danger of being deſtroyed in ſevere winters. The ſecond ſort is commonly propagated by laying down the branches, though it may alſo be raiſed from the ſeed in the manner already directed for the piſtachia-nut tree: And in this manner alſo may the true maſtic-tree be raiſed; but this, being more tender than any of the other ſorts, requires to be conſtantly ſheltered in winter, and to have a warm ſituation in ſummer.

Uſes. Piſtachia nuts abound with a ſweet and well-taſted oil, which they yield in great abundance on being preſſed after bruiſing them: they are reckoned wholeſome and nutritive; and are very proper to be preſcribed by way of reſtoratives, eaten in ſmall quantity, to people emaciated by long illneſs.

PISTIL, among botaniſts, the little upright column which is generally found in the centre of every flower. According to the Linnæan ſyſtem, it is the female part of generation, whoſe office is to receive and ſecrete the pollen, and produce the fruit. It conſiſts of three parts, *viz.* germen, ſtylus, and ſtigma.

PISTOL, the ſmalleſt piece of fire-arms, borne at the ſaddle-bow, on the girdle, and in the pocket.

PISTOLE, a gold coin, ſtruck in Spain, and in ſeveral parts of Italy, Switzerland, &c.—The piſtole has its augmentations and diminutions, which are quadruple piſtoles, double piſtoles, and half piſtoles. See MONEY-*Table.*

PISTON, in pump-work, is a ſhort cylinder of metal or other ſolid ſubſtance, fitted exactly to the cavity of the barrel or body of the pump. See HYDROSTATICS, ſect. v.

PISUM, PEASE; a genus of the decandria order, belonging to the diadelphia claſs of plants. The ſpecies are, 1. The ſativum, or greater garden-pea, whoſe lower ſtipulæ are roundiſh, indented, with taper foot-ſtalks and many flowers on a foot-ſtalk. 2. The humile, or dwarf pea, with an erect branching ſtalk, and leaves having two pair of round lobes. 3. The umbellatum, roſe, or crown-pea, with four-pointed acute ſtipulæ, and foot-ſtalks bearing many flowers, which terminate the ſtalks. 4. The maritimum, or ſea-pea, with foot-ſtalks which are plain on their upper ſide, an angular ſtalk, arrow-pointed ſtipulæ, and foot-ſtalks bearing many flowers. 5. The Americanum, commonly called *Cape-Horn pea,* with an angular trailing ſtalk, whoſe lower leaves are ſpear-ſhaped, ſharply indented, and thoſe at the top arrow-pointed. 6. The ochrus, with membranaceous running foot-ſtalks, having two leaves and one flower upon a foot-ſtalk.

There is a great variety of garden peaſe now cultivated in Britain, which are diſtinguiſhed by the gardeners and ſeedſmen, and have their different titles; but as great part of theſe have been ſeminal variations, ſo if they are not very carefully managed, by taking away all thoſe plants which have a tendency to alter before the ſeeds are formed, they will degenerate into their original ſtate: therefore all thoſe perſons who are curious in the choice of their ſeeds, look carefully over thoſe which they deſign for ſeeds at the time when they begin to flower, and draw out all the plants which they diſlike from the other. This is what they call *roguing their peaſe;* meaning hereby, the taking out all the bad plants from the good, that the farina of the former may not impregnate the latter; to prevent which, they always do it before the flowers open. By thus diligently drawing out the bad, reſerving thoſe which come earlieſt to flower, they have greatly improved their peaſe of late years, and are conſtantly endeavouring to get forwarder varieties; ſo that it would be to little purpoſe in this place, to attempt giving a particular account of all the varieties now cultivated: therefore we ſhall only mention their titles by which they are commonly known; placing them according to their time of coming to the table, or gathering for uſe.

The golden hotſpur.
The Charlton.
The Reading hotſpur.
Maſter's hotſpur.
Eſſex hotſpur.
The dwarf pea.
The ſugar pea.
Spaniſh Morotto.
Nonpareil.
Sugar dwarf.
Sickle pea.
Marrowfat.
Roſe or crown pea.
Rouncival pea.
Gray pea.
Pig pea; with ſome others.

The Engliſh ſea-pea is found wild upon the ſhore in Suſſex and ſeveral other counties in England, and is undoubtedly a different ſpecies from the common pea.

The fifth ſpecies hath a biennial root, which continues two years. This was brought from Cape Horn by Lord Anſon's cook, when he paſſed that Cape, where theſe peaſe were a great relief to the ſailors. It is kept here as a curioſity, but the peaſe are not ſo good for eating as the worſt ſort now cultivated in Britain. It is a low trailing plants: the leaves have two lobes on each foot-ſtalk: thoſe below are ſpear-ſhaped, and ſharply indented on their edges; but the upper leaves are ſmall, and arrow-pointed. The flowers are blue, each foot-ſtalk ſuſtaining four or five flowers; the pods are taper, near three inches long; and the ſeeds are round, about the ſize of tares.

The ſixth ſort is annual. This grows naturally among the corn in Sicily and ſome parts of Italy, but is here preſerved in botanic gardens for the ſake of variety. It hath an angular ſtalk riſing near three feet high; the leaves ſtand upon winged foot-ſtalks, each ſuſtaining two oblong lobes. The flowers are of a pale yellow colour, ſhaped like thoſe of the other ſort of pea, but are ſmall, each foot-ſtalk ſuſtaining one flower; theſe are ſucceeded by pods about two inches long, containing five or ſix roundiſh ſeeds, which are a little compreſſed on their ſides. Theſe are by ſome perſons eaten green; but unleſs they are gathered very young, they are coarſe, and at beſt not ſo good as the common pea. It may be ſown and managed in the ſame way as the garden pea.

We ſhall now proceed to ſet down the method of cultivating the ſeveral ſorts of garden peaſe, ſo as to continue them throughout the ſeaſon.

It is a common practice with the gardeners near London, to raiſe peaſe upon hot-beds, to have them very early in the ſpring; in order to which, they ſow their peaſe upon warm borders, under walls or hedges, about the middle of October; and when the plants come up, they draw the earth up gently to their ſtems with a hoe, the better to protect them from froſt. In theſe places they let them remain until the latter end of January, or the beginning of February, obſerving to earth them up from time to time as the plants advance in height (for the reaſons before given); as alſo to cover them in very hard froſt with peaſe-haulm, ſtraw, or ſome other light covering, to preſerve them from being deſtroyed; then, at the time before-mentioned, they make a hot-bed (in proportion to the quantity of peaſe intended), which muſt be made of good hot dung, well prepared and properly mixed together, that the heat may not be too great. The dung ſhould be laid for two or three feet thick, according as the beds are made earlier or later in the ſeaſon; when the dung is equally levelled, then the earth (which ſhould be light and freſh, but not over rich), muſt be laid thereon about ſix or eight inches thick, laying it equally all over the bed. This being done, the frames (which ſhould be two feet high on the back ſide, and about 14 inches in front), muſt be put on, and covered with glaſſes; after which, it ſhould remain three or four days, to let the ſteam of the bed paſs off before you put the plants therein, obſerving every day to raiſe the glaſſes, to give vent for the riſing ſteam to paſs off; then, when you find the bed of a moderate temperature for heat, you ſhould, with a trowel, or ſome other inſtrument, take up the plants as carefully as poſſible to preſerve the earth to their roots, and plant them into the hot-bed in rows about two feet aſunder, and the plants about an inch diſtant from each other in the rows, obſerving to water and ſhade them until they have taken root; after which you muſt be careful to give them air at all times when the ſeaſon is favourable, otherwiſe they will draw up very weak, and be ſubject to grow mouldy and decay. You ſhould alſo draw the earth up to the ſhanks of the plants as they advance in height, and keep them always clear from weeds. The water they ſhould have muſt be given them ſparingly; for if they are too much watered, it will cauſe them to grow too rank, and ſometimes rot off the plants at their ſhanks juſt above ground. When the weather is very hot, you ſhould cover the glaſſes with mats in the heat of the day, to ſcreen them from the violence of the heat of the ſun, which is then too great for them: but when the plants begin to fruit, they ſhould be watered oftener, and in greater plenty than before; for by that time the plants will have nearly done growing, and the often refreſhing them will occaſion their producing a greater plenty of fruit.

The ſort of pea which is generally uſed for this purpoſe, is the dwarf; for all the other ſorts ramble too much to be kept in frames: the reaſon for ſowing them in the common ground, and afterwards tranſplanting them on a hot-bed, is to check their growth, and cauſe them to bear in leſs compaſs; for if the ſeeds were ſown upon a hot-bed, and the plants continued thereon, they would produce ſuch luxuriant plants as could not be contained in the frames, and would bear but little fruit.

The next ſort of pea, which is ſown to ſucceed thoſe on the hot-bed, is the hotſpur, of which there are reckoned ſeveral varieties, as the golden hotſpur, the Charlton hotſpur, the Maſters's hotſpur, the Reading hotſpur, and ſome others; which are very little differing from each other, except in their early bearing, for which the golden and Charlton hotſpurs are chiefly preferred; though if either of theſe ſorts are cultivated in the ſame place for three or four years, they are apt to degenerate, and be later in fruiting; for which reaſon, moſt curious perſons procure their ſeeds annually from ſome diſtant place; and in the choice of theſe ſeeds, if they could be obtained from a colder ſituation and a poorer ſoil than that in which they are to be ſown, it will be much better than on the contrary, and they will come earlier in the ſpring.

Theſe muſt alſo be ſown on warm borders, toward the latter end of October; and when the plants are come up, you ſhould draw the earth up to their ſhanks and treat them in every other reſpect as above directed.

In the ſpring you muſt carefully clear them from weeds, and draw ſome freſh earth up to their ſtems; but do not raiſe it too high up to the plants, leſt by burying their leaves you ſhould rot their ſtems, as is ſometimes the caſe, eſpecially in wet ſeaſons. You ſhould alſo obſerve to keep them free from vermin, which, if permitted to remain amongſt the plants, will increaſe ſo plentifully as to devour the greateſt part of them. The chief of the vermin which infeſt peaſe are ſlugs, which lie all the day in the ſmall hollows of the earth, near the ſtems of the plants, and in the night-time come out and make terrible deſtruction of the peaſe; and theſe chiefly abound in wet ſoils, or where a garden is neglected and over-ru nwith weeds: therefore you ſhould make the ground clear every way round the peaſe to deſtroy their harbours; and afterwards in a fine mild morning very early, when theſe vermin are got abroad from their holes, you ſhould ſlake a quantity of lime, which ſhould be ſtrewed over the ground pretty thick, which will deſtroy the vermin wherever it happens to fall upon them, but will do very little injury to the peaſe, provided it be not ſcattered too thick upon them.

If this crop of peaſe ſucceeds, it will immediately follow thoſe on the hot-bed; but for fear this ſhould miſcarry, it will be proper to ſow two more crops at about a fortnight or three weeks diſtance from each other, ſo that there may be the more chances to ſucceed. This will be ſufficient till the ſpring of the year, when you may ſow ſeveral more crops of theſe peaſe at a fortnight diſtance from each other. The late ſowings will be ſufficient to continue the early ſort of peaſe through the ſeaſon, but it will be proper to have ſome of the large ſort to ſucceed them for the uſe of the family; in order to which, you ſhould ſow ſome of the Spaniſh Morotto, which is a great bearer and a hardy ſort of pea, about the middle of February, upon a clear open ſpot of ground. Theſe muſt be ſown in rows about four feet aſunder, and the peaſe ſhould be dropped in the drills about an inch diſtance, covering them about two inches deep with earth, being very careful that none of them lie uncovered, which will draw the mice, pigeons, or rooks, to attack the whole ſpot; and it often happens, by this neglect, that a whole plantation is devoured by theſe creatures; whereas, when there are none of the peaſe left in ſight, they do not eaſily find them out.

About a fortnight after this you ſhould ſow another ſpot, either of this ſort or any other large ſort of pea, to ſucceed thoſe; and then continue to repeat ſowing once a fortnight, till the middle or latter end of May; only obſerving to allow the marrowfats, and other very large ſorts of peaſe, at leaſt four feet and a half between row and row; and the roſe-pea ſhould be allowed at leaſt eight or ten inches diſtance plant from plant in the rows; for theſe grow very large, and if they have not room allowed them, they will ſpoil each other by drawing them up very tall, and will produce no fruit.

When the plants come up, the earth ſhould be drawn up to their ſhanks (as was before directed), and the ground kept entirely clear from weeds; and when the plants are grown eight or ten inches high, you ſhould ſtick ſome bruſhwood into the ground cloſe to the peaſe for them to ramp upon, which will ſupport them from trailing upon the ground, which is very apt to rot the growing ſorts of peaſe, eſpecially in wet ſeaſons; beſides, by thus ſupporting them, the air can freely paſs between them, which will preſerve the bloſſoms from falling off before their time, and occaſion them to bear much better than if permitted to lie upon the ground, and there will be room to paſs between the rows to gather the peaſe when they are ripe.

The dwarf ſorts of peaſe may be ſown much cloſer together than thoſe before-mentioned; for theſe ſeldom riſe above a foot high, and rarely ſpread above half a foot in width, ſo that theſe need not have more room than two feet row from row, and not above an inch aſunder in the rows. Theſe will produce a good quantity of peaſe, provided the ſeaſon be not over-dry; but they ſeldom continue long in bearing, ſo that they are not ſo proper to ſow for the main crop when a quantity of peaſe is expected for the table, their chief excellency being for hot-beds, where they will produce a greater quantity of peaſe (provided they are well managed) than if expoſed to the open air, where the heat of the ſun ſoon dries them up.

The large growing ſorts may be cultivated for the common uſe of the family, becauſe theſe will produce in greater quantities than the other, and will endure the drought better; but the early kind are by far the ſweeter-taſted peaſe.

The beſt of all the large kinds is the marrowfat, which, if gathered young, is a well-taſted pea; and this will continue good through the month of Auguſt, if planted on a ſtrong ſoil.

The gray and other large winter-peaſe are ſeldom cultivated in gardens, becauſe they require a great deal of room, but are uſually ſown in fields. For the proper method of managing them, ſee AGRICULTURE, n° 124.

PITCAIRNE (Dr Archibald), a moſt eminent phyſician and ingenious poet, was deſcended from the ancient family of the Pitcairnes of Pitcairne in Fifeſhire, and was born at Edinburgh on the 25th of December 1652. He commenced his ſtudies at the ſchool of Dalkeith; and from thence he was removed to the univerſity of Edinburgh, where he improved himſelf in claſſical learning, and completed a regular courſe of philoſophy. His friends, according to the authors of the *Biographia Britannica*, were deſirous that he ſhould follow the profeſſion of theology. The unpleaſant gloom, however, which at that time hung over religion and its profeſſors in Scotland, could not but very ill ſuit with that native cheerfulneſs of temper and liberality of mind which made him, long after, a mark for the arrows of preciſeneſs and grimace. The law ſeems to have been his own choice, and to this ſcience he turned his attention. With an ardour peculiar to himſelf, and an ambition to excel in whatever he undertook, he purſued it with ſo much intenſeneſs, that his health began to be impaired. On this account, his phyſicians adviſed him to ſet out for the ſouth of France. By the time he reached Paris, he was happily ſo far recovered, that he determined to renew his ſtudies; but being informed that there was no able profeſſor of law in that city, and finding ſeveral gentlemen of his acquaintance engaged in the ſtudy of phyſic, he went with them to the lectures and hoſpitals, and employed himſelf in this manner for ſeveral months, till his affairs called him home.

On his return, he applied himſelf chiefly to the mathematics. It is not uſual to ſee the briars of this ſcience and the flowers of poetry growing in the ſame ſoil. Here, however, they were happily united; and to this union perhaps was owing that ſingular command of judgment, over one of the livelieſt of fancies, which appears in every part of his works. His intimacy with Dr David Gregory, the celebrated mathematical profeſſor, began about the ſame time; and probably conduced to cheriſh his natural aptitude for this ſtudy. It was then, in a great meaſure, new to him; it ſoon became his principal delight; his progreſs in it was rapid, and correſpondent to his progreſs in other purſuits. His improvements on the method of infinite ſeries then adopted, which Dr Wallis of Oxford afterwards publiſhed, were a conſpicuous and early proof of his abilities in this ſcience.

Had Dr Pitcairne continued to proſecute the ſtudy of the law, and could he have moulded his principles to the times, the firſt offices and honours of the ſtate might have been looked for without preſumption as the probable reward of ſuch talents as he poſſeſſed. Struck, however, with the charms of mathematical truth which had been lately introduced into the philoſophy of medicine, and hoping to reduce the healing art to geometrical method, he unalterably determined on this leſs aſpiring profeſſion. At the period when he formed this reſolution, the ideas of the medical world, already ſufficiently confuſed, were ſtill farther jumbled by the diſcovery of the circulation of the blood, which had as yet produced nothing but doubt, uncertainty, and aſtoniſhment. In Edinburgh at that time there was no ſchool, no hoſpital, no opportunity of improvement but the chamber and the ſhop. He therefore ſoon after returned to Paris. Genius and induſtry are unhappily not often united in the ſame character: of ſuch an union Dr Pitcairne is a celebrated inſtance. During his reſidence in France, he cultivated the object of his purſuit with his natural enthuſiaſm, and with a ſteadineſs from which he could not be diverted by the allurements of that joy, which, in his hours of ſocial and feſtive intercourſe, he always felt and always gave. Among his various occupations, the ſtudy of the ancient phyſicians ſeems to have had a principal ſhare. This appears from a treatiſe which he publiſhed ſome time after his return; and it ſhows, that he wiſely determined to know the progreſs of medicine from its earlieſt periods, before he attempted to reform and improve that ſcience.

On the 13th of Auguſt 1680, he received, from the faculty of Rheims, the degree of Doctor; which, on the 7th of Auguſt 1699, was likewiſe conferred on him by the univerſity of Aberdeen; both being attended with marks of peculiar diſtinction. Other medical honours are ſaid to have been conferred on him in France and elſewhere; but nothing affords a more unequivocal teſtimony to his abilities than that which the ſurgeons of Edinburgh gave, in admitting him, freely and unſolicited, a member of their college. None had ſuch opportunities of judging of his merit as a practitioner, and on no phyſician did they ever beſtow the ſame public mark of reſpect. Soon after his graduation at Rheims, he returned to Edinburgh; where, on the 29th of November 1681, the Royal College of Phyſicians was inſtituted; and his name, among others, graced the original patent from the Crown.

In his *Solutio problematis de inventoribus*, the treatiſe above alluded to, he diſcovers a wonderful degree of medical literature, and makes uſe of it in a manner that does great honour both to his head and his heart. His object is to vindicate Dr Harvey's claim to the diſcovery of the circulation of the blood. The diſcovery was, at firſt, controverted by envy, and reprobated by ignorance. When at length its truth was fully eſtabliſhed, many invidiouſly attempted to tear the laurels from the illuſtrious Engliſhman, and to plant them on the brows of Hippocrates and others. Had the attempt been directed againſt himſelf, the generous ſoul of Pitcairne could not have exerted more zeal in a defence; and his arguments remain unanſwered.

During his reſidence in Scotland, his reputation became ſo conſiderable, that, in the year 1691, the univerſity of Leyden ſolicited him to fill the medical chair, at that time vacant. Such an honourable teſtimony of reſpect, from a foreign nation, and from ſuch a univerſity, cannot perhaps be produced in the medical biography of Great Britain. The luſtre of ſuch characters reflects honour on their profeſſion, and on the country which has the good fortune of giving them birth; and ſerves to give the individuals of that country not only a uſeful eſtimation in their own eyes, but in thoſe alſo of the reſt of the world. Dr Pitcairne's well-known political principles excluded him from public honours and promotion at home: he therefore accepted the invitation from abroad; and, on the 26th of April 1692, delivered, at Leyden, his elegant and maſterly inaugural oration: *Oratio qua oſtenditur medicinam ab omni philoſophorum ſecta eſſe liberam*. In this he clears medicine from the rubbiſh of the old philoſophy; ſeparates it from the influence of the different ſects; places it on the broad and only ſure foundation of experience; ſhows how little good inquiries into the manner how medicines operate have done to the art; and demonſtrates the neceſſity of a ſedulous attention to their effects, and to the various appearances of diſeaſe.

Nothing (ſays an elegant panegyriſt * of our author) marks a ſuperiority of intellect ſo much as the courage requiſite to ſtem a torrent of obſtinately prevailing and groundleſs opinions. For this the genius and talents of Pitcairne were admirably adapted; and, in his oration, he diſplays them to the utmoſt. It was received with the higheſt commendations; and the adminiſtrators, to teſtify their ſenſe of ſuch an acquiſition to their univerſity, greatly augmented the ordinary appointment of his chair.

He diſcharged the duties of his office at Leyden ſo as to anſwer the moſt ſanguine expectations. He taught with a perſpicuity and eloquence which met with univerſal applauſe. Independently of the encomiums of Boerhaave and Mead, who were his pupils, the numerous manuſcript copies of his lectures, and the mutilated ſpecimen of them † which found its way into the world without his knowledge, ſhow how juſtly it was beſtowed. At the ſame time, he was not more celebrated as a profeſſor than as a practical phyſician; and notwithſtanding the multiplicity of his buſineſs in both theſe characters, he found leiſure to publiſh ſeveral treatiſes on the circulation and ſome other of the moſt important parts of the animal œconomy (A).

At the cloſe of the ſeſſion, he ſet out for Scotland, with an intention of returning in time for the ſucceeding one. On his marrying (B) the daughter of Sir Archibald Stevenſon, the object of his journey, her relations would on no account conſent to part with him again. He was therefore reluctantly obliged to remain; and he wrote the univerſity a polite apology, which was received with the utmoſt regret. He even declined the moſt flattering ſolicitations and tempting offers to ſettle in London. Indeed he ſoon came into that extenſive practice to which his abilities entitled

34 X 2

---

* Dr Ch. Webſter, in the *Harveian Oration* at Edinburgh for the year 1781; from which performance the preſent article is chiefly extracted.

† *Elementa Medicinæ.*

(A) Dr Boerhaave gives the following character of theſe and ſome other of Dr Pitcairne's diſſertations, which were collected and publiſhed at Rotterdam, anno 1701: "Hæc ſcripta optima ſunt et perfecta, ſive legas Diſſertationem de Motu Sanguinis per Pulmones, ſive alia opuſcula, ſive ultimum tractatum de Opio." *Methodus ſtudii, ab Hallero edita*, p. 569.

(B) He had been married before to a daughter of Colonel James Hay of Pitfour, by whom he had a ſon and daughter, who both died young.

titled him, and was alſo appointed titular profeſſor of medicine in the univerſity of Edinburgh.

The uniformity of a profeſſional life is ſeldom interrupted by incidents worthy of record. Specimens, however, of that brilliant wit with which he delighted his friends in the hours of his leiſure, continue to entertain us (C); and the effects of that eminent ſkill which he exerted in the cure of diſeaſe, ſtill operate to the good of poſterity.

The diſcovery of the circulation, while in ſome meaſure it exploded the chemical and Galenical doctrines, tended to introduce mathematical and mechanical reaſoning in their ſtead. Of this theory (D) Dr Pitcairne was the principal ſupport, and the firſt who introduced it into Britain. A mathematical turn of mind, and a wiſh for mathematical certainty in medicine, biaſſed him in its favour, and he puſhed it to its utmoſt extent. One is at a loſs whether moſt to admire or regret ſuch a waſte of talents in propping a theory, which, though ſubverſive of former ones, was to fall before others but a little more ſatisfactory than itſelf. Mechanical phyſicians expected more from geometry than that ſcience could grant. They made it the foundation inſtead of an auxiliary to their inquiries, and applied it to parts of nature not admitting mathematical calculations. By paying more attention afterwards to the ſupreme influence of the living principle, the ſource of all the motions and functions of the body, it was found that theſe could not be explained by any laws of chemiſtry or mechaniſm. They are ſtill, however, involved in obſcurity; and, notwithſtanding the numberleſs improvements which have taken place in the ſciences connected with medicine, will perhaps remain inſcrutable while man continues in his preſent ſtage of exiſtence.

In a ſcience ſo ſlowly progreſſive as that of medicine, Dr Pitcairne did a great deal. By labouring in vain for truth in one road, he ſaved many the ſame drudgery, and thereby ſhewed the neceſſity of another. He not only exploded many falſe notions of the chemiſts and Galeniſts, which prevailed in his time, but many of thoſe too of his own ſect. In particular, he ſhewed the abſurdity of referring all diſeaſes and their cures to an alkali or an acid (E). He refuted the idea of ſecretion being performed by pores differently ſhaped (F), Bellini's opinion of efferveſcences in the animal-ſpirits with the blood, and Borelli's of air entering the blood by reſpiration (G). He proved the continuity of the arteries and veins (H); and ſeems to have been the firſt who ſhewed that the blood flows from a ſmaller capacity into a larger, that the aorta, with reſpect to the arterial ſyſtem, is the apex of a cone (I). In this therefore he may be conſidered as the latent ſpring of the diſcoveries reſpecting the powers moving the blood. He introduced a ſimplicity of preſcription, unknown in pharmacy before his time (K); and ſuch was the ſtate of medicine in this country, that ſcarcely have the works of any contemporary or preceding author been thought worthy even of preſervation (L). As to the errors of his philoſophy, let it be remembered, that no theory has as yet ſtood the teſt

---

(C) Vide *Pitcarnii Poemata*.---Several of his poems, however, are obſcure, and ſome of them totally unintelligible without a key. In thoſe of them which are of a political kind, he wiſhed not to expreſs himſelf too clearly; and in others, he alludes to private occurrences which were not known beyond the circle of his companions. His poem (*ad Lindeſium*), addreſſed to his friend Lindſey, is commented on by the authors of the Biographia Britannica; and it is to be regretted that it is the only one on which they have been ſolicitous to throw light. "Some parts (ſay they) of this poem are hardly intelligible, without knowing a circumſtance in the Doctor's life, which he often told, and never without ſome commotion. It is a well-known ſtory of the two Platonic philoſophers, who promiſed one another, that which ever died firſt ſhould make a viſit to his ſurviving companion. This ſtory being read together by Mr Lindſey and our author, they, being both then very young, entered into the ſame engagement. Soon after, Pitcairne, at his father's houſe in Fife, dreamed one morning, that Lindſey, who was then at Paris, came to him, and told him he was not dead, as was commonly reported, but ſtill alive, and lived in a very agreeable place, to which he could not yet carry him. By the courſe of the poſt, news came of Lindſey's death, which happened very ſuddenly the morning of the dream. When this is known, the poem is eaſily underſtood, and ſhines with no common degree of beauty.

" Lyndeſi! Stygias jam dudum vecte per undas,
  " Stagnaque Cocyti non adeunda mihi;
" Excute pauliſper Lethæi vincula ſomni,
  " Ut feriant animum carmina noſtra tuum.
" Te nobis, te redde tuis, promiſſa daturus
  " Gaudia; ſed proavo ſis comitante redux:
" Namque novos viros mutataque regna videbis,
  " Paſſaque Teutonicas ſceptra Britanna manus *. [* Written in 1689.]

" He then proceeds to exclaim againſt the principles and practices which produced this Teutonic violence upon the Britiſh ſceptre; and concludes with a wiſh, that Lindſey might bring Radamanthus with him to puniſh them.

" Unus abeſt ſcelerum vindex Radamanthus; amice,
  " Dii faciant reditus ſit comes ille tui!

" Every one ſees how much keener an edge is given to the ſatire upon the Revolution, by making it an additional reaſon for his friend's keeping his promiſe to return him a viſit after his death."

(D) See the article MEDICINE, nº 99.—Borelli, Bellini, &c. eſpouſed the ſame.

(E) Pitcarnii Diſſertationes, Edin, edit. 1713. De opera quam præſtant corpora acida vel alkalica in curatione morborum.

(F) De circulatione ſanguinis per vaſa minima.

(G) De diverſa mole qua ſanguis fluit per pulmones.

(H) De circulatione ſanguinis per vaſa minima.

(I) De circulatione ſanguinis in animalibus genitis et non genitis.

(K) Elementa Medicinæ, lib. i. cap. 21. et paſſim.

(L) The firſt medical publication which diſtinguiſhed this country, after Dr Pitcairne's, was that of the Edinburgh Medical Eſſays, in the year 1732. Vid. the article MONRO.

teſt of many years in an enlightened period. His own hung very looſely about him (m), and the preſent generally received practice differs from his very little in reality. He treated inflammatory and hæmorrhagic diſeaſes by bleeding, purging, and bliſtering, as has been done uniformly and ſolely on the different theories ſince. His method of adminiſtering mercury and the bark is obſerved at this day; and with reſpect to febrile, nervous, glandular, and dropſical affections, they ſeem to be as often the opprobriums of the art now, as they were then.

Dr Pitcairne was univerſally conſidered as the firſt phyſician of his time. No one appears ever to have had ſo much practice in this country, or ſo many conſultations from abroad; and no one, from all accounts, ever practiſed with greater ſagacity and ſucceſs. The higheſt thought themſelves honoured by his acquaintance, and the loweſt were never denied his aſſiſtance and advice. The emoluments of his profeſſion muſt have been great; but his charities are known to have been correſpondent. The poſſeſſion of money he poſtponed to more liberal objects: he collected one of the fineſt private libraries in the world; which was purchaſed, after his death, by the Czar of Muſcovy. Notwithſtanding the fatigues he underwent in the exerciſe of his profeſſion, his conſtitution was naturally delicate. About the beginning of October 1713, he became affected with his laſt illneſs; and on the 23d he died, regretted by ſcience as its ornament, by his country as its boaſt, and by humanity as its friend. He left a ſon and four daughters; of whom only one of the latter now ſurvives. The preſent noble family of Kelly are his grandchildren.

Some anonymous publications are attributed to Dr Pitcairne, particularly a treatiſe *De Legibus Hiſtoriæ Naturalis*, &c.; but the only ones he thought proper to legitimate are his *Diſſertationes Medicæ*, and a ſhort eſſay *De Salute*.

PITCH, a tenacious oily ſubſtance, drawn chiefly from pines and firs, and uſed in ſhipping, medicine, and various arts: or it is more properly tar inſpiſſated by boiling it over a ſlow fire. See Tar.

PITCHING, in ſea-affairs, may be defined, the vertical vibration which the length of a ſhip makes about her centre of gravity; or the movement by which ſhe plunges her head and after-part alternately into the hollow of the ſea. This motion may proceed from two cauſes: the waves, which agitate the veſſel; and the wind upon the ſails, which makes her ſtoop to every blaſt thereof. The firſt abſolutely depends upon the agitation of the ſea, and is not ſuſceptible of inquiry; and the ſecond is occaſioned by the inclination of the maſts, and may be ſubmitted to certain eſtabliſhed maxims.

When the wind acts upon the ſails, the maſt yields to its effort, with an inclination, which increaſes in proportion to the length of the maſt, to the augmentation of the wind, and to the comparative weight and diſtribution of the ſhip's lading.

The repulſion of the water, to the effort of gravity, oppoſes itſelf to this inclination, or at leaſt ſuſtains it, by as much as the repulſion exceeds the momentum, or abſolute effort of the maſt, upon which the wind operates. At the end of each blaſt, when the wind ſuſpends its action, this repulſion lifts the veſſel; and theſe ſucceſſive inclinations and repulſions produce the movement of pitching, which is very inconvenient; and, when it is conſiderable, will greatly retard the courſe, as well as endanger the maſt, and ſtrain the veſſel.

PITH, in vegetation, the ſoft ſpungy ſubſtance contained in the central parts of plants and trees *.

PITISCUS (Samuel), a learned antiquary, born at Zutphen, was rector of the college of that city, and afterwards of St Jerome at Utrecht, where he died on the 1ſt of February 1717, aged ninety. He wrote, 1. *Lexicon Antiquitatum Romanorum*, in two volumes folio; a work which is eſteemed. 2. Editions of many Latin authors, with notes; and other works.

PITS (John), the biographer, was born in 1560, at Aulton in Hampſhire; and educated at Wykeham's ſchool, near Wincheſter, till he was about 18 years of age; when he was ſent to New-college in Oxford, and admitted probationer fellow. Having continued in that univerſity not quite two years, he left the kingdom as a voluntary Romiſh exile, and retired to Doway: thence he went to the Engliſh college at Rheims, where he remained about a year; and then proceeded to Rome, where he continued a member of the Engliſh college near ſeven years, and was made a prieſt. In 1589 he returned to Rheims; and there, during two years, taught rhetoric and the Greek language. He now quitted Rheims, on account of the civil war in France; and retired to Pont à Mouſſon in Loraine, where he took the degrees of maſter of arts and bachelor in divinity. Hence he travelled into Germany; and reſided a year and a half at Triers, where he commenced licentiate in his faculty. From Triers he viſited ſeveral of the principal cities in Germany; and continuing three years at Ingolſtadt in Bavaria, took the degree of doctor in divinity. Thence having made the tour of Italy, he returned once more to Loraine; where he was patroniſed by the cardinal of that duchy, who preferred him to a canonry of Verdun; and about two years after, he became confeſſor to to the ducheſs of Cleves, daughter to the duke of Loraine. During the leiſure he enjoyed in this employment, he wrote in Latin the lives of the kings, biſhops, apoſtolical men, and writers of England. The laſt of theſe, commonly known and quoted by this title, *De illuſtribus Angliæ ſcriptoribus*, was publiſhed after his death. The three firſt remain ſtill in manuſcript, among the archives of the collegiate church of Liverdun. The duke of Cleves dying, after Pits had been about twelve years confeſſor to the ducheſs, ſhe returned to Loraine, attended by our author, who was promoted to the deanery of Liverdun, which, with a canonry and officialſhip, he enjoyed to the end of his life. He died in 1616, and was buried in the collegiate church. Pits was undoubtedly a ſcholar, and not an inelegant writer; but he is juſtly accuſed of ingratitude to Bale, from whom he borrowed his materials, without acknowledgment. He quotes Leland

---

* See *Plant*.

(m) Patet, *ſays he*, medicinam eſſe memoriam eorum quæ cuilibet morbo uſus oſtendit fuiſſe utilia. Nam notas non eſſe corporum intra venas fluentium aut conſiſtentium naturas, adeoque ſola obſervatione innoteſcere quid cuique morbo conveniat, poſtquam ſæpius eadem eidem morbo profuiſſe comperimus. *De Div. Morb.*

Pitt.

land with great familiarity, without ever having ſeen his book: his errors are innumerable, and his partiality to the Romiſh writers moſt obvious; nevertheleſs we are obliged to him for his account of ſeveral popiſh authors, who lived abroad at the beginning of the Reformation.

PITT (Chriſtopher), an eminent Engliſh poet, celebrated for his excellent tranſlation of Virgil's Æneid, was born in the year 1699. Having ſtudied four years at New-college, Oxford, he was preſented to the living of Pimperne in Dorſetſhire, which he held during the remainder of his life. He had ſo poetical a turn, that while he was a ſchool-boy he wrote two large folios of manuſcript poems, one of which contained an entire tranſlation of Lucan. He was much eſteemed while at the univerſity; particularly by the celebrated Dr Young, who uſed familiarly to call him his *ſon*. Next to his fine tranſlation of Virgil, Mr Pitt gained the greateſt reputation by his excellent Engliſh tranſlation of Vida's art of poetry. This amiable poet died in the year 1648, without leaving, it is ſaid, one enemy behind him.

PITT (William) earl of Chatham, a moſt celebrated Britiſh ſtateſman and patriot, was born in November 1708. He was the youngeſt ſon of Robert Pitt, Eſq; of Boconnock in Cornwall; and grandſon of Thomas Pitt, Eſq; governor of Fort St George in the Eaſt Indies, in the reign of queen Anne, who ſold an extraordinary fine diamond to the king of France for 135,000 l. and thus obtained the name of *Diamond Pitt*. His intellectual faculties and powers of elocution very ſoon made a diſtinguiſhed appearance; but, at the age of 16, he felt the attacks of an hereditary and incurable gout, by which he was tormented at times during the reſt of his life.

His lordſhip entered early into the army, and ſerved in a regiment of dragoons. Through the intereſt of the ducheſs of Marlborough, he obtained a ſeat in parliament before he was 21 years of age. His firſt appearance in the houſe was as repreſentative of the borough of Old Sarum, in the ninth parliament of Great Britain. In the 10th he repreſented Seaford, Aldborough in the 11th, and the city of Bath in the 12th; where he continued till he was called up to the houſe of peers in 1766. The intention of the ducheſs in bringing him thus early into parliament was to oppoſe Sir Robert Walpole, and whom he kept in awe by the force of his eloquence. At her death the ducheſs left him 10,000 l. on condition, as was then reported, that he ſhould never receive a place in adminiſtration. However, if any ſuch condition was made, it certainly was not kept on his Lordſhip's part. In 1746 he was appointed vice-treaſurer of Ireland, and ſoon after paymaſter general of the forces, and ſworn a privy-counſellor. He diſcharged the office of paymaſter with ſuch honour and inflexible integrity, refuſing even many of the perquiſites of his office, that his bittereſt enemies could lay nothing to his charge, and he ſoon became the darling of the people. In 1755 he reſigned the office of paymaſter, on ſeeing Mr Fox preferred to him. The people were alarmed at this reſignation; and being diſguſted with the unſucceſsful beginning of the war, complained ſo loudly, that, on the 4th December 1756, Mr Pitt was appointed ſecretary of ſtate in the room of Mr Fox afterwards Lord Holland; and other promotions were made in order to ſecond his plans. He then took ſuch meaſures as were neceſſary for the honour and intereſt of the nation; but in the month of February 1757, having refuſed to aſſent to the carrying on a war in Germany for the ſake of his majeſty's dominions on the continent, he was deprived of the ſeals on the 5th of April following. Upon this the complaints of the people again became ſo violent, that on the 29th of June he was again appointed ſecretary, and his friends to other important offices. The ſucceſs with which the war was now conducted is univerſally known; yet on the 5th of October 1761, Mr Pitt, to the aſtoniſhment of almoſt the whole kingdom, reſigned the ſeals into his majeſty's own hands. The reaſon of this was, that Mr Pitt, having received certain intelligence that the family-compact was ſigned between France and Spain, and that the latter was about to join France againſt us, thought it neceſſary to prevent her by commencing hoſtilities firſt. Having communicated this opinion in the privy-council, the other miniſters urged that they would think twice before they declared war againſt this kingdom. "I will not give them leave to think, (replied Mr Pitt); this is the time, let us cruſh the whole houſe of Bourbon. But if the members of this board are of a different opinion, this is the laſt time I ſhall ever mix in its councils. I was called into the miniſtry by the voice of the people, and to them I hold myſelf anſwerable for my conduct. I am to thank the miniſters of the late king for their ſupport; I have ſerved my country with ſucceſs; but I will not be reſponſible for the conduct of the war any longer than while I have the direction of it." To this bold declaration, the lord who then preſided in council, made the following reply. "I find the gentleman is determined to leave us; nor can I ſay that I am ſorry for it, ſince he would otherwiſe have certainly compelled us to leave him. But if he is reſolved to aſſume the right of adviſing his majeſty, and directing the operations of the war, to what purpoſe are we called to this council? When he talks of being reſponſible to the people, he talks the language of the houſe of commons, and forgets that at this board he is reſponſible only to the king. However, though he may poſſibly have convinced himſelf of his infallibility, ſtill it remains that we ſhould be equally convinced before we can reſign our underſtandings to his direction, or join with him in the meaſure he propoſes."

This converſation, which was followed by Mr Pitt's reſignation, is ſufficient to ſhew the haughtineſs and imperious temper of our miniſter. However, theſe very qualities were ſometimes productive of great and good conſequences, as appears from the following anecdote.—Preparatory to one of the ſecret expeditions during the laſt war, the miniſter had given orders to the different preſiding officers in the military, navy, and ordnance departments, to prepare a large body of forces, a certain number of ſhips, and a proportionable quantity of ſtores, &c. and to have them all ready againſt a certain day. To theſe orders he received an anſwer from each of the officers, declaring the total impoſſibility of a compliance with them. Notwithſtanding it was then at a very late hour, he ſent immediately for his ſecretary; and after expreſſing his reſentment at the ignorance or negligence of his majeſty's ſervants,

vants, he gave the following commands:—" I deſire, Mr Wood, that you will immediately go to Lord Anſon; you need not trouble yourſelf to ſearch the admiralty, he is not to be found there; you muſt purſue him to the gaming-houſe, and tell him from me, that if he does not obey the orders of government which he has received at my hands, that I will moſt aſſuredly impeach him. Proceed from him to Lord Ligonier; and though he ſhould be bolſtered with harlots, undraw his curtains, and repeat the ſame meſſage. Then direct your courſe to Sir Charles Frederick, and aſſure him, that if his majeſty's orders are not obeyed, they ſhall be the laſt which he ſhall receive from me." In conſequence of theſe commands, Mr Wood proceeded to White's, and told his errand to the firſt lord of the admiralty; who inſiſted that the ſecretary of ſtate was out of his ſenſes, and it was impoſſible to comply with his wiſhes: " however, (added he), as madmen muſt be anſwered, tell him that I will do my utmoſt to ſatiſfy him." From thence he went to the commander in chief of the forces, and delivered the ſame meſſage. He alſo ſaid that it was an impoſſible buſineſs; " and the ſecretary knows it, (added the old lord): nevertheleſs, he is in the right to make us do what we can; and what is poſſible to do, inform him, ſhall be done." The ſurveyor-general of the ordnance was next informed of Mr Pitt's reſolution; and, after ſome little conſideration, he began to think that the orders might be completed within the time preſcribed. The conſequence, at laſt, was, that every thing, in ſpite of impoſſibilities themſelves, was ready at the time appointed.

After his reſignation in 1761, Mr Pitt never had any ſhare in adminiſtration. He received a penſion of 3000l. a-year, to be continued after his deceaſe, during the ſurvivancy of his lady and ſon; and this gratuity was dignified with the title of *Baroneſs of Chatham* to his lady, and that of *baron* to her heirs-male. Mr Pitt at that time declined a title of nobility; but in 1766 accepted of a peerage under the title of *Baron Pynſent and Earl of Chatham*, and at the ſame time he was appointed lord privy-ſeal.

This acceptance of a peerage proved very prejudicial to his lordſhip's character. However, he continued ſtedfaſt in his oppoſition to the meaſures of adminiſtration. His laſt appearance in the Houſe of Lords was on the 2d of April 1778. He was then very ill and much debilitated: but the queſtion was important; being a motion of the duke of Richmond to addreſs his majeſty to remove the miniſters, and make peace with America on any terms. His lordſhip made a long ſpeech, which had certainly overcome his ſpirits: for, attempting to riſe a ſecond time, he fell down in a convulſive fit; and though he recovered for that time, his diſorder continued to increaſe till the 11th of May, when he died at his ſeat at Hayes. His death was lamented as a national loſs. As ſoon as the news reached the houſe of commons, which was then ſitting, Colonel Barré made a motion, that an addreſs ſhould be preſented to his majeſty, requeſting that the Earl of Chatham ſhould be buried at the public expence. But Mr Rigby having propoſed the erecting of a ſtatue to his memory, as more likely to perpetuate the ſenſe of his great merits entertained by the public, this was unanimouſly carried. A bill was ſoon after paſſed, by which 4000l. a-year was ſettled upon John, now Earl of Chatham, and the heirs of the late Earl to whom that title may deſcend.—His lordſhip was married in 1754 to Lady Heſter, ſiſter to the earl of Temple; by whom he had three ſons and two daughters.

PITUITARY GLAND. See ANATOMY, n° 397, c.

PIVAT, or PIVOT, a foot or ſhoe of iron or other metal, uſually conical or terminating in a point, whereby a body, intended to turn round, bears on another fixed at reſt, and performs its revolutions. The pivot uſually bears or turns round in a ſole, or piece of iron or braſs, hollowed to receive it.

PIZARRO (Francis), a celebrated Spaniſh general, the diſcoverer and conqueror of Peru, in conjunction with Diego Almagro, a Spaniſh navigator. They are both charged with horrid cruelties to the inhabitants; and they fell victims to their own ambition, jealouſy, and avarice. Almagro revolting, was defeated, and beheaded by Pizarro, who was aſſaſſinated by Almagro's friends, in 1541. See PERU.

PLACE, LOCUS, in philoſophy, a mode of ſpace, or that part of immoveable ſpace which any body poſſeſſes. See METAPHYSICS, n° 50.

PLACE in aſtronomy. The place of the ſun, a ſtar, &c. denotes the ſign and degree of the zodiac which the luminary is in; or the degree of the ecliptic, reckoning from the beginning of aries, which the planet or ſtar's circle of longitude cuts; and therefore coincides with the longitude of the ſun, planet, or ſtar. As the ſine of the ſun's greateſt declination 23° 30′: to the ſine of any preſent declination given or obſerved, for inſtance, 23° 15′:: ſo is the radius 10: to the ſine of his longitude 81° 52′; which, if the declination were north, would give 20° 52′ of gemini; if ſouth, 20° 52′ of capricorn, for the ſun's place. See DECLINATION, &c.

The place of the moon being that part of her orbit wherein ſhe is found at any time, is of various kinds, by reaſon of the great inequalities of the lunar motions, which render a number of equations and reductions neceſſary before the juſt point be found. The moon's fictitious place is her place once equated; her place nearly true, is her place twice equated; and her true place thrice equated. See ASTRONOMY, *paſſim*.

PLACE, in war, a general name for all kinds of fortreſſes where a party may defend themſelves. Thus, 1. A ſtrong or fortified place, is one flanked, and covered with baſtions. 2. A regular place, one whoſe angles, ſides, baſtions, and other parts, are equal; and this is uſually denominated from the number of its angles, as a pentagon, hexagon, &c. 3. Irregular place, is one whoſe ſides and angles are unequal. 4. Place of arms, is a ſtrong city or town pitched upon for the chief magazine of an army; or, in a city or garriſon, it is a large open ſpot of ground, uſually near the centre of the place where the grand guard is commonly kept, and the garriſon holds its rendezvous at reviews, and in caſes of alarm to receive orders from the governor. 5. Places of arms of an attack, in a ſiege, is a ſpacious place covered from the enemy by a parapet or epaulement, where the ſoldiers are poſted ready to ſuſtain thoſe at work in the trenches againſt the ſoldiers of the garriſon. 6. Place of arms particular, in a garriſon, a place near every baſtion, where the ſoldiers ſent from the grand place to the quarters aſſigned them relieve thoſe that are either upon the guard or in fight. 7. Place of arms without, is a place allowed to the covert-way for the planting of cannon, to oblige thoſe who advance in their approaches to retire. 8. Place of arms in a camp, a large place at the head of the camp for the army to be ranged in and drawn up in battlia. There is alſo a place for each particular body, troop, or company, to aſſemble in.

Common-PLACE. See COMMON-*Place*.

PLACENTA, in anatomy and midwifery, a ſoft roundiſh maſs, found in the womb of pregnant women; which, from its reſemblance to the liver, was called by the ancients *hepar uterinum*, uterine liver.

PLACENTIA, a town of Italy, and capital of a duchy of the ſame name, with a biſhop's ſee. It is ſeated about 100 paces from the river Po, in a very fertile pleaſant plain, watered by a great number of rivulets, and ſurrounded with hills, abounding in all ſorts of fruits. In its territory there are ſalt-ſprings, from which they make a very white ſalt; and there are alſo mines of iron, woods, and warrens. It is very populous, and contains a great number of merchants. It is defended by a wall and a ſtrong citadel, and is reckoned three miles in circumference. The houſes are low, generally built of brick, and ſome of them are prettily painted. The cathedral is an ancient ſtructure, but well adorned within. The number of the inhabitants is about 18,000, among whom there are 2000 eccleſiaſtics. This city has been taken ſeveral times in the wars of Italy. The king of Sardinia took poſſeſſion of it in 1744, it being ceded to him by the queen of Hungary; but it was taken from him in 1746, after a bloody battle. It has a famous univerſity, and the inhabitants are much eſteemed for their politeneſs. There is a great fair here every year on the 15th of April, which is much frequented. Placentia is ſeated on the river Po, in E. Long. 9. 43. N. Lat. 45. 5.

PLAGIARY, in philology, the purloining another man's works, and putting them off as our own. Among the Romans, *plagiarius* was properly a perſon who bought, ſold, or retained a freeman for a ſlave; and was ſo called, becauſe, by the Flavian law, ſuch perſons were condemned *ad plagas*, "to be whipped."

Thomaſius has an expreſs treatiſe *De plagio literario*; wherein he lays down the laws and meaſures of the right which authors have to one another's writings.—"Dictionary-writers, at leaſt ſuch as meddle with *arts and ſciences*, (as is pertinently obſerved by Mr Chambers), ſeem exempted from the common laws of *meum* and *tuum*; they do not pretend to ſet up on their own bottom, nor to treat you at their own coſt. Their works are ſuppoſed, in great meaſure, compoſitions of other peoples'; and what they take from others, they do it avowedly, and in the open ſun.—In effect, their quality gives them a title to every thing that may be for their purpoſe, wherever they find it; and if they rob, they do not do it any otherwiſe, than as the bee does, for the public ſervice. Their occupation is not pillaging, but collecting contributions; and if you aſk them their authority, they will produce you the practice of their predeceſſors of all ages and nations."

PLAGIUM, in law. See KIDNAPPING.

PLAGUE, PESTILENCE, or *Peſtilential Fever*. See MEDICINE, nº 325.

The commiſſion at Moſcow, having, in the year 1770, invented a fumigation-powder, which, from ſeveral leſſer experiments, had proved efficacious in preventing the infection of the plague; in order more fully to aſcertain its virtue in that reſpect, it was determined, towards the end of the year, that ten malefactors under ſentence of death, ſhould, without undergoing any other precautions than the fumigations, be confined three weeks in a lazarette, be laid upon the beds, and dreſſed in the cloaths, which had been uſed by perſons ſick, dying, and even dead, of the plague in the hoſpital. The experiment was accordingly tried, and none of the ten malefactors were then infected, or have been ſince ill. The fumigation-powder is prepared as follows.

Powder of the firſt ſtrength.] Take leaves of juniper, juniper-berries pounded, ears of wheat, guaiacum-wood pounded, of each ſix pounds; common ſaltpetre pounded, eight pounds; ſulphur pounded, ſix pounds; Smyrna tar, or myrrh, two pounds; mix all the above ingredients together, which will produce a pood of the powder of fumigation of the firſt ſtrength. [*N. B.* A pood is 40 pounds Ruſſian, which are equal to 35 pounds and a half or 36 pounds Engliſh averdupoiſe.]

Powder of the ſecond ſtrength.] Take ſouthernwood cut into ſmall pieces, four pounds; juniper-berries pounded, three pounds; common ſaltpetre pounded, four pounds; ſulphur pounded, two pounds and a half; Smyrna tar, or myrrh, one pound and a half: mix the above together, which will produce half a pood of the powder of fumigation of the ſecond ſtrength.

Odoriferous powder.] Take the root called *kalmus* cut into ſmall pieces, three pounds; leaves of juniper cut into ſmall pieces, four pounds; frankincenſe pounded groſsly, one pound; ſtorax pounded, and roſe-flowers, half a pound; yellow amber pounded, one pound; common ſaltpetre pounded, one pound and a half; ſulphur, a quarter of a pound: mix all the above together, which will produce nine pounds and three quarters of the odoriferous powder.

Remark on the powder of fumigation.] If guaiacum cannot be had, the cones of pines or firs may be uſed in its ſtead; likewiſe the common tar of pines and firs may be uſed inſtead of the Smyrna tar or myrrh, and mugwort may ſupply the place of ſouthernwood.

PLAIN, or PLANE, in general, an appellation given to whatever is ſmooth and even, or ſimple, obvious, and eaſy to be underſtood; and, conſequently, ſtands oppoſed to rough, enriched, or laboured.

A plain figure, in geometry, is an uniform ſurface; from every point of whoſe perimeter right lines may be drawn to every other point in the ſame.

A plain angle is one contained under two lines, or ſurfaces, in contradiſtinction to a ſolid angle. See ANGLE.

The doctrine of plain triangles, as thoſe included under three right lines, is termed *plain trigonometry*. See the article TRIGONOMETRY.

PLAIN *Chart*. See the article CHART.

PLAIN-*Sailing*. See NAVIGATION, § 1.

PLAISE, the Engliſh name of a ſpecies of pleuronectes. See PLEURONECTES.

PLAN, in general, denotes the repreſentation of ſomething drawn on a plane: ſuch are maps, charts, inchnographies, &c. See MAP, CHART, &c.

The term *plan*, however, is particularly uſed for a draught of a building, ſuch as it appears, or is intended to appear, on the ground; ſhewing the extent, diviſion, and diſtribution of its area, or ground-plot, into apartments, rooms, paſſages, &c.

A geometrical plan is that wherein the ſolid and vacant parts are repreſented in their natural proportions.

The raiſed plan of a building, is the ſame with what is otherwiſe called an *elevation*, or *orthography*. See ORTHOGRAPHY.

A perſpective plan, is that exhibited by degradations, or diminutions, according to the rules of perſpective. See PERSPECTIVE.

To render plans intelligible, it is uſual to diſtinguiſh the maſſives, with a black waſh; the projectures on the ground are drawn in full lines, and thoſe ſuppoſed over them in dotted lines. The augmentations, or alterations to be made, are diſtinguiſhed by a colour different from what is already built; and the tints of each plan made lighter, as the ſtories are raiſed.

In large buildings, it is uſual to have three ſeveral plans, for the three firſt ſtories.

PLANE, in geometry, denotes a plain ſurface, or one that lies evenly between its bounding lines: and as a right line is the ſhorteſt extenſion from one point to another, ſo a plane ſurface is the ſhorteſt extenſion from one line to another.

In aſtronomy, conics, &c. the term *plane* is frequently uſed for an imaginary ſurface, ſuppoſed to cut and paſs through ſolid bodies; and on this foundation is the whole doctrine of conic ſections built. See ASTRONOMY, CONIC SECTIONS, &c.

In mechanics, planes are either horizontal, that is, parallel to the horizon, or inclined thereto. See MECHANICS.

The determining how far any given plane deviates from an horizontal line, makes the whole buſineſs of levelling. See the article LEVELLING.

In optics, the planes of reflection and refraction, are thoſe drawn through the incident and reflected or refracted rays. See OPTICS.

In perſpective, we meet with the perſpective plane, which is ſuppoſed to be pellucid, and perpendicular to the horizon; the horizontal plane, ſuppoſed to paſs through the ſpectator's eye, parallel to the horizon; the geometrical plane, likewiſe parallel to the horizon, wherein the object to be repreſented is ſuppoſed to be placed, &c. See PERSPECTIVE.

The plane of projection in the ſtereographic projection of the ſphere, is that on which the projection is made, correſponding to the perſpective plane. See PROJECTION.

PLANE, in joinery, an edged tool or inſtrument for parting and ſhaving of wood ſmooth.—It conſiſts of a piece of wood very ſmooth at bottom, as a ſtock or ſhaft; in the midſt of which is an aperture, through which a ſteel edge, or chiſſel, placed obliquely, paſſes; which, being very ſharp, takes off the inequalities of the wood along which it ſlides.

PLANE-*Tree*, in botany. See PLATANUS.

PLANET, a celeſtial body, revolving round the ſun as a centre, and continually changing its poſition with reſpect to the fixed ſtars; whence the name *planet*, which is a Greek word, ſignifying "wanderer."

The planets are uſually diſtinguiſhed into primary, and ſecondary. The primary ones, called by way of eminence *planets*, are thoſe which revolve round the ſun as a centre; and the ſecondary planets, more uſually called *ſatellites*, or *moons*, are thoſe which revolve round a primary planet as a centre, and conſtantly attend it in its revolution round the ſun.

The primary planets, are again diſtinguiſhed into ſuperior and inferior. The ſuperior planets, are thoſe further from the ſun than our earth; as Mars, Jupiter, and Saturn: and the inferior planets, are thoſe nearer the ſun than our earth, as Venus and Mercury. See ASTRONOMY.

That the planets are opake bodies, like our earth, is thought probable for the following reaſons. 1. Since in Venus, Mercury, and Mars, only that part of the diſk illuminated by the ſun, is found to ſhine; and again, Venus and Mercury, when between the earth and the ſun, appear like dark ſpots or maculæ on the ſun's diſk; it is evident, that Mars, Venus, and Mercury, are opake bodies, illuminated with the borrowed light of the ſun. And the ſame appears of Jupiter, from its being void of light in that part to which the ſhadow of the ſatellites reaches, as well as in that part turned from the ſun; and that his ſatellites are opake, and reflect the ſun's light, is abundantly ſhown. Wherefore, ſince Saturn, with his ring and ſatellites, only yield a faint light, fainter conſiderably than that of the fixed ſtars, tho' theſe be vaſtly more remote; and than that of the reſt of the planets; it is paſt doubt, that he too, with his attendants, are opake bodies. 2. Since the ſun's light is not tranſmitted through Mercury and Venus, when placed againſt him, it is plain they are denſe opake bodies; which is likewiſe evident of Jupiter, from his hiding the ſatellites in his ſhadow; and therefore, by analogy, the ſame may be concluded of Saturn. 3. From the variable ſpots of Venus, Mars, and Jupiter, it is evident theſe planets have a changeable atmoſphere; which changeable atmoſphere may, by a like argument, be inferred of the ſatellites of Jupiter; and therefore, by ſimilitude, the ſame may be concluded of the other planets. 4. In like manner, from the mountains obſerved in Venus, the ſame may be ſuppoſed in the other planets. 5. Since then, Saturn, Jupiter, both their ſatellites, Mars, Venus, and Mercury, are opake bodies, ſhining with the ſun's borrowed light, are furniſhed with mountains, and encompaſſed with a changeable atmoſphere; they have, of conſequence, waters, ſeas, &c. as well as dry land, and are bodies like the moon, and therefore like the earth. *Q. E. D.* And hence, it ſeems alſo highly probable, that the other planets have their animal inhabitants, as well as our earth.

PLANETARIUM, an aſtronomical machine, ſo called from its repreſenting the motions, orbits, &c.

of the planets, agreeable to the Copernican ſyſtem. See Astronomy, n° 317. and Plate LI.

PLANETARY, ſomething that relates to the planets. Hence we ſay, planetary worlds, planetary inhabitants, &c. Huygens and Fontenelle bring ſeveral probable arguments for the reality of planetary animals, plants, men, &c. See Planet.

Planetary *Syſtem*, is the ſyſtem or aſſemblage of the planets, primary and ſecondary, moving in their reſpective orbits, round their common centre the ſun. See Astronomy.

Planetary *Days*.—Among the ancients, the week was ſhared among the ſeven planets, each planet having its day. This we learn from Dion Caſſius and Plutarch, *Sympoſ.* l. 4. q. 7. Herodotus adds, that it was the Egyptians who firſt diſcovered what god, that is, what planet, preſides over each day; for that among this people the planets were directors. And hence it is, that in moſt European languages, the days of the week are ſtill denominated from the planets; Sunday, Monday, &c. See Week.

Planetary *Years*, the periods of time where the ſeveral planets make their revolutions round the ſun, or earth.—As from the proper revolution of the ſun, the ſolar year takes its original; ſo from the proper revolutions of the reſt of the planets about the earth, ſo many ſorts of years do ariſe, viz. the Saturnian year, which is defined by 29 Egyptian years, 174 hours, 58 minutes, equivalent in a round number to 30 ſolar years.—The Jovial year, containing 317 days, 14 hours, 59 minutes.—The Martial year, containing 321 days, 23 hours, 31 minutes.—For Venus and Mercury, as their years, when judged of with regard to the earth, are almoſt equal to the ſolar year; they are more uſually eſtimated from the ſun, the true centre of their motions: in which caſe, the former is equal to 224 days, 16 hours, 40 minutes; the latter to 87 days, 23 hours, 14 minutes.

PLANIMETRY, that part of geometry which conſiders lines and plain figures, without conſidering their height or depth. See Geometry.

PLANISPHERE, ſignifies a projection of the ſphere, and its various circles on a plane; in which ſenſe, maps, whereon are exhibited the meridians, and other circles of the ſphere, are planiſpheres. See Map.

PLANT, is defined to be an organical body, deſtitute of ſenſe and ſpontaneous motion, adhering to another body in ſuch a manner as to draw from it its nouriſhment, and having a power of propagating itſelf by ſeeds.

The vegetation and œconomy of plants is one of thoſe ſubjects in which our knowledge is extremely circumſcribed. A total inattention to the ſtructure and œconomy of plants is the chief reaſon of the ſmall progreſs that has been made in the principles of vegetation, and of the inſtability and fluctuation of our theories concerning it; for which reaſon we ſhall give a ſhort deſcription of the ſtructure of plants, beginning with the ſeed, and tracing its progreſs and evolution to a ſtate of maturity.

1. *Of Seeds.*] The ſeeds of plants are of various figures and ſizes. Moſt of them are divided into two lobes; though ſome, as thoſe of the creſs-kind, have ſix; and others, as the grains of corn, are not divided, but entire.

But, as the eſſential properties of all ſeeds are the ſame, when conſidered with regard to the principles of vegetation, our particular deſcriptions ſhall be limited to one ſeed, *viz.* the great garden-bean. Neither is the choice of this ſeed altogether arbitrary; for, after it begins to vegetate, its parts are more conſpicuous than many others, and conſequently better calculated for inveſtigation.

This ſeed is covered with two coats or membranes. The outer coat is extremely thin, and full of pores; but may be eaſily ſeparated from the inner one (which is much thicker), after the bean has been boiled, or lain a few days in the ſoil. At the thick end of the bean, there is a ſmall hole viſible to the naked eye, immediately over the radicle or future root, that it may have a free paſſage into the ſoil; fig. 1. A. When theſe coats are taken off, the body of the ſeed appears, which is divided into two ſmooth portions or lobes. The ſmoothneſs of the lobes is owing to a thin film or cuticle with which they are covered.

Plate CCXXXIX.

At the baſis of the bean is placed the radicle or future root, fig. 3. A. The trunk of the radicle, juſt as it enters into the body of the ſeed, divides into two capital branches, one of which is inſerted into each lobe, and ſends off ſmaller ones in all directions thro' the whole ſubſtance of the lobes; fig. 7. AA. Theſe ramifications become ſo extremely minute towards the edges of the lobes, that they require the fineſt glaſſes to render them viſible. To theſe ramifications Grew and Malpighius have given the name of *ſeminal root;* becauſe, by means of it, the radicle and plume, before they are expanded, derive their principal nouriſhment.

The plume, bud, or germ, fig. 3. is incloſed in two ſmall correſponding cavities in each lobe. Its colour and conſiſtence is much the ſame with thoſe of the radicle, of which it is only a continuation; but having a quite contrary direction: for the radicle deſcends into the earth, and divides into a great number of ſmaller branches or filaments; but the plume aſcends into the open air, and unfolds itſelf into all the beautiful variety of ſtem, branches, leaves, flowers, fruit, &c. The plume in corn ſhoots from the ſmaller end of the grain, and, among maltſters, goes by the name of *acroſpire*.

The next thing to be taken notice of is the ſubſtance, or parenchymatous part, of the lobes. This is not a mere concreted juice, but is curiouſly organiſed, and conſiſts of a vaſt number of ſmall bladders reſembling thoſe in the pith of trees; fig. 4.

Beſides the coats, cuticle, and parenchymatous parts, there is a ſubſtance perfectly diſtinct from theſe, diſtributed in different proportions through the radicle, plume, and lobes. This inner ſubſtance appears very plainly in a tranſverſe ſection of the radicle or plume. Towards the extremity of the radicle, it is one entire trunk; but higher up, it divides into three branches; the middle one runs directly up to the plume, and the other two paſs into the lobes on each ſide, and ſpread out into a great variety of ſmall branches through the whole body of the lobes, fig. 7. This ſubſtance is very properly termed the *ſeminal root:* for when the ſeed is ſown, the moiſture is firſt abſorbed by the outer coats, which are every where furniſhed with ſap and air-veſſels; from theſe it is conveyed to the cuticle; from the cuticle it proceeds to the pulpy part of the lobes; when it has got thus far, it is taken up by the mouths of the ſmall branches of the ſeminal root, and paſſes from one branch into another, till it is all collected into the main trunk, which communicates both with the plume and radicle, the two principal involved organs of the future plant. After this the ſap, or vegetable food, runs in two oppoſite directions: part of it aſcends into the plume, and promotes the growth and expanſion of that organ; and part of it deſcends into the radicle, for nouriſhing and evolving the root and its various filaments. Thus the plume and racicle continue their progreſs in oppoſite directions, till the plant arrives at maturity.

It is here worth remarking, that every plant is really poſſeſſed of two roots, both of which are contained in the ſeed. The plume and radicle, when the ſeed is firſt depoſited in the earth, derive their nouriſhment from the ſeminal root: but, afterwards, when the radicle begins to ſhoot out its filaments, and to abſorb ſome moiſture, not, however, in a ſufficient quantity to ſupply the exigencies of the plume, the two lobes, or main body of the ſeed, riſe along with the plume, aſſume the appearance of two leaves, reſembling the lobes of the ſeed in ſize and ſhape, but having no reſemblance to thoſe of the plume, for which reaſon they have got the name of *diſſimilar leaves*.

Theſe diſſimilar leaves defend the young plume from the injuries of the weather; and at the ſame time, by abſorbing dew, air, &c. aſſiſt the tender radicle in nouriſhing the plume, with which they have ſtill a connection by means of the ſeminal root above deſcribed. But, when the radicle or ſecond root has deſcended deep enough into the earth, and has acquired a ſufficient number of filaments or branches for abſorbing as much aliment as is proper for the growth of the plume; then the ſeminal or diſſimilar leaves, their utility being entirely ſuperſeded, begin to decay and fall off.

Plate XXXIX Fig. 1. A, the foramen or hole in the bean through which the radicle ſhoots into the ſoil.

Fig. 2. A tranverſe ſection of the bean; the dotes being the branches of the ſeminal root.

Fig. 3. A, the radicle. B, the plume or bud.

Fig. 4. A, a longitudinal ſection of one of the lobes of the bean a little magnified, to ſhow the ſmall bladders of which the pulpy or parenchymatous part is compoſed.

Fig. 5, 6. A, a tranſverſe ſection of the radicle. B, a tranſverſe ſection of the plume, ſhowing the organs or veſſels of the ſeminal root.

Fig. 7. A view of the ſeminal root branched out upon the lobes.

Fig. 8. The appearance of the radicle, plume, and ſeminal root, when a little further advanced in growth.

Having thus briefly deſcribed the ſeed, and traced its evolution into three principal organic parts, *viz.* the plume, radicle, and ſeminal leaves, we ſhall next take an anatomical view of the root, trunk, leaves, &c.

2. *Of the Root.*] In examining the root of plants, the firſt thing that preſents itſelf is the ſkin, which is of various colours in different plants. Every root, after it has arrived at a certain age, has a double ſkin. The firſt is coeval with the other parts, and exiſts in the ſeed: but afterwards there is a ring ſent off from the bark, and forms a ſecond ſkin; *e. g.* in the root of the dandelion, towards the end of May, the original or outer ſkin appears ſhriveled, and is eaſily ſeparated from the new one, which is freſher, and adheres more firmly to the bark. Perennial plants are ſupplied in this manner with a new ſkin every year; the outer one always falls off in the autumn and winter, and a new one is formed from the bark in the ſucceeding ſpring. The ſkin has numerous cells or veſſels, and is a continuation of the parenchymatous part of the radicle. However, it does not conſiſt ſolely of parenchyma; for the microſcope ſhews that there are many tubular ligneous veſſels interſperſed through it.

When the ſkin is removed, the true cortical ſubſtance or bark appears, which is alſo a continuation of the parenchymatous part of the radicle, but greatly augmented. The bark is of very different ſizes. In moſt trees, it is exceeding thin in proportion to the wood and pith. On the other hand, in carrots, it is almoſt one half of the ſemidiameter of the root; and, in dandelion, it is nearly twice as thick as the woody part.

The **Bark** is compoſed of two ſubſtances; the parenchyma, or pulp, which is the principal part; and a few woody fibres. The parenchyma is exceedingly porous, and has a great reſemblance to a ſpunge; for it ſhrivels conſiderably when dried, and dilates to its former dimenſions when infuſed in water. Theſe pores or veſſels are not pervious ſo as to communicate with each other; but conſiſt of diſtinct little cells or bladders, ſcarcely viſible without the aſſiſtance of the microſcope. In all roots, theſe cells are conſtantly filled with a thin watery liquor. They are generally of a ſpherical figure; though in ſome roots, as the bugloſs and dandelion, they are oblong. In many roots, as the horſe-radiſh, peony, aſparagus, potatoe, &c. the parenchyma is of one uniform ſtructure. But in others it is more diverſified, and puts on the ſhape of rays running from the centre towards the circumference of the bark. Theſe rays ſometimes run quite through the bark, as in lovage; and ſometimes advance towards the middle of it, as in melilot and moſt of the leguminous and umbelliferous plants. Theſe rays generally ſtand at an equal diſtance from each other in the ſame plant; but the diſtance varies greatly in different plants. Neither are they of equal ſizes: in carrot they are exceedingly ſmall, and ſcarcely diſcernible; in melilot and chervil, they are thicker. They are likewiſe more numerous in ſome plants than in others. Sometimes they are of the ſame thickneſs from one edge of the bark to the other; and ſome grow wider as they approach towards the ſkin. The veſſels with which theſe rays are amply furniſhed, are ſuppoſed to be air-veſſels, becauſe they are always found to be dry, and not ſo tranſparent as the veſſels which evidently contain the ſap.

In all roots, there are ligneous veſſels diſperſed in different proportions through the parenchyma of the bark. Theſe ligneous veſſels run longitudinally through the bark in the form of ſmall threads, which are tubular, as is evident from the riſing of the ſap in them when a root is cut tranſverſely. Theſe ligneous ſap-veſſels do not run in direct lines through the bark, but, at ſmall diſtances, incline towards one another in ſuch a manner, that they appear to the naked eye to be inoſculated; but the microſcope diſcovers them to be

Plant.

only contiguous, and braced together by the parenchyma. Theſe braces or coarctations are very various both in ſize and number in different roots; but in all plants they are moſt numerous towards the inner edge of the bark. Neither are theſe veſſels ſingle tubes; but, like the nerves in animals, are bundles of 20 or 30 ſmall contiguous cylindrical tubes, which uniformly run from the extremity of the root, without ſending off any branches, or ſuffering any change in their ſize or ſhape.

In ſome roots, as parſnip, eſpecially in the ring next the inner extremity of the bark, theſe veſſels contain a kind of lymph, which is ſweeter than the ſap contained in the bladders of the parenchyma. From this circumſtance they have got the name of *lymph-ducts*.

Theſe lymph-ducts ſometimes yield a mucilaginous lymph, as in the comphrey; and ſometimes a white milky glutinous lymph, as in the angelica, ſonchus, burdock, ſcorzonera, dandelion, &c. The lymph-ducts are ſuppoſed to be the veſſels from which the gums and balſams are ſecerned. The lymph of fennel, when expoſed to the air, turns into a clear tranſparent balſam; and that of the ſcorzonera, dandelion, &c. condenſes into a gum.

The ſituation of the veſſels is various. In ſome plants, they ſtand in a ring or circle at the inner edge of the bark, as in aſparagus; in others, they appear in lines, or rays, as in borage; in the parſnip, and ſeveral other plants, they are moſt conſpicuous toward the outer edge of the bark; and in the dandelion, they are diſpoſed in the form of concentric circles.

The Wood of roots is that part which appears after the bark is taken off, and is firmer and leſs porous than the bark or pith. It conſiſts of two diſtinct ſubſtances, *viz.* the pulpy or parenchymatous, and the ligneous. The wood is connected to the bark by large portions of the bark inſerted into it. Theſe inſertions are moſtly in the form of rays, tending to the centre of the pith, which are eaſily diſcernible by the eye in a tranſverſe ſection of moſt roots. Theſe inſertions, like the bark, conſiſt of many veſſels, moſtly of a round or oval figure.

The ligneous veſſels are generally diſpoſed in collateral rows running longitudinally through the root. Some of theſe contain air, and others ſap. The *air-veſſels* are ſo called, becauſe they contain no liquor. Theſe air-veſſels are diſtinguiſhed by being whiter than the others.

The Pith is the centrical part of the root. Some roots have no pith, as the ſtramonium, nicotiana, &c.; others have little or none at the extremities of the roots, but have a conſiderable quantity of it near the top. The pith, like every other part of a plant, is derived from the ſeed: but in ſome it is more immediately derived from the bark. For the inſertions of the bark running in betwixt the rays of the wood, meet in the centre, and conſtitute the pith. It is owing to this circumſtance, that, among roots which have no pith in their lower parts, they are amply provided with it towards the top, as in columbine, lovage, &c.

The bladders of the pith are of very different ſizes, and generally of a circular figure. Their poſition is more uniform than in the bark. Their ſides are not mere films, but a compoſition of ſmall fibres or threads; which gives the pith, when viewed with a microſcope, the appearance of a piece of fine gauze or net-work.

We ſhall conclude the deſcription of roots, with obſerving, that their whole ſubſtance is nothing but a congeries of tubes and fibres, adapted by nature for the abſorption of nouriſhment, and of courſe the extenſion and augmentation of their parts.

Plate CCXXXIX.

Fig. 9. A tranſverſe ſection of the root of wormwood, as it appears to the naked eye.

Fig. 10. A ſection of fig. 9. magnified. AA, the ſkin, with its veſſels. BBBB, the bark. The round holes CCC, &c. are the lymph-ducts of the back: All the other holes are little cells and ſap veſſels. DDD, parenchymatous inſertions from the bark, with the cells, &c. EEEE, the rays of the wood, in which the holes are the air-veſſels. *N. B.* This root has no pith.

3. *Of the Trunk, Stalk, or Stem.*] In deſcribing the trunks of plants, it is neceſſary to premiſe, that whatever is ſaid with regard to them, applies equally to the branches.

The trunk, like the root, conſiſts of three parts, *viz.* the bark, wood, and pith. Theſe parts, though ſubſtantially the ſame in the trunk as in the root, are in many caſes very different in their texture and appearance.

The ſkin of the Bark is compoſed of very minute bladders, interſperſed with longitudinal woody fibres, as in the nettle, thiſtle, and moſt herbs. The outſide of the ſkin is viſibly porous in ſome plants, particularly the cane.

The principal body of the bark is compoſed of pulp or parenchyma, and innumerable veſſels much larger than thoſe of the ſkin. The texture of the pulpy part, though the ſame ſubſtance with the parenchyma in roots, yet ſeldom appears in the form of rays running towards the pith; and when theſe rays do appear, they do not extend above half way to the circumference. The veſſels of the bark are very differently ſituated, and deſtined for various purpoſes in different plants. For example, in the bark of the pine, the inmoſt are lymph-ducts, and exceedingly ſmall; the outmoſt are gum or reſiniferous veſſels, deſtined for the ſecretion of turpentine; and are ſo large, as to be diſtinctly viſible to the naked eye.

The Wood lies between the bark and pith, and conſiſts of two parts, *viz.* a parenchymatous, and ligneous. In all trees, the parenchymatous part of the wood, though much diverſified as to ſize and conſiſtence, is uniformly diſpoſed in diametrical rays, or inſertions running betwixt ſimilar rays of the ligneous part.

The true wood is nothing but a congeries of old dried lymph-ducts. Between the bark and the wood a new ring of theſe ducts is formed every year, which gradually looſes its ſoftneſs as the cold ſeaſon approaches, and, towards the middle of winter, is condenſed into a ſolid ring of wood. Theſe annual rings, which are diſtinctly viſible in moſt trees when cut thro', ſerve as natural marks to diſtinguiſh their age, (fig. 1. 2.) The rings of one year are ſometimes larger, ſometimes leſs, than thoſe of another, probably owing to the favourableneſs or unfavourableneſs of the ſeaſon.

Plate CCXL.

The Pith, though of a different texture, is exactly of the ſame ſubſtance with the parenchyma of the

Plate CCXXXIX.

Fig. 1. GARDEN BEAN

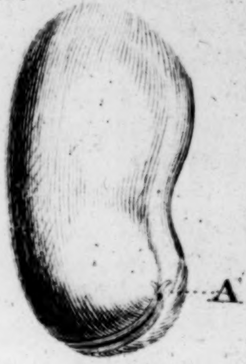


Fig. 2.

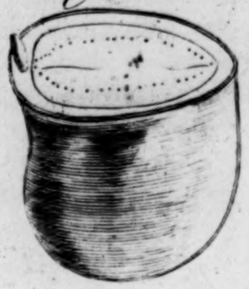


Fig. 3.

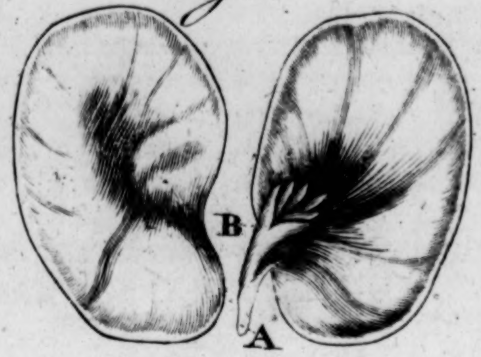


Fig. 4. Slice of a BEAN

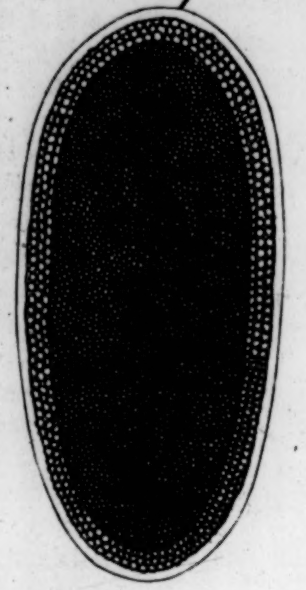


Fig. 5. Radical

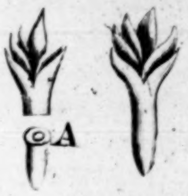


Fig. 6. plume

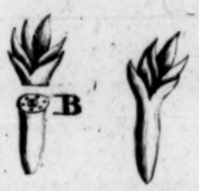


Fig. 7.

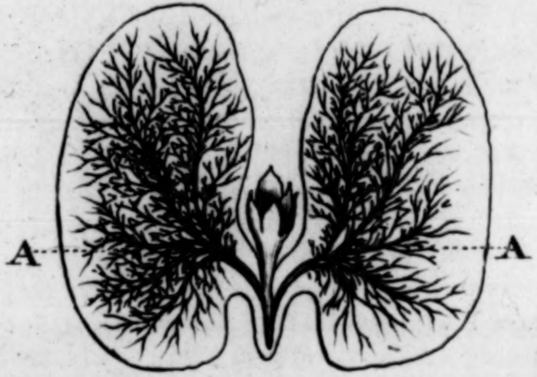


Fig. 8.

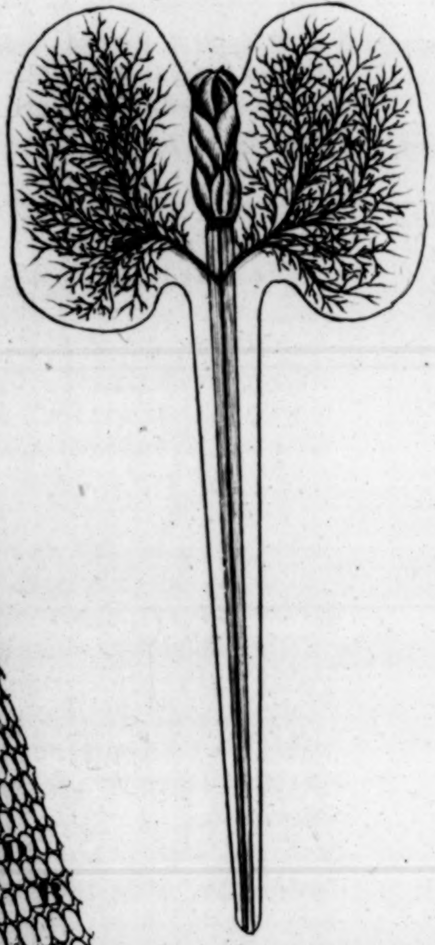


Fig. 10. Section of Fig. 9. Magnified

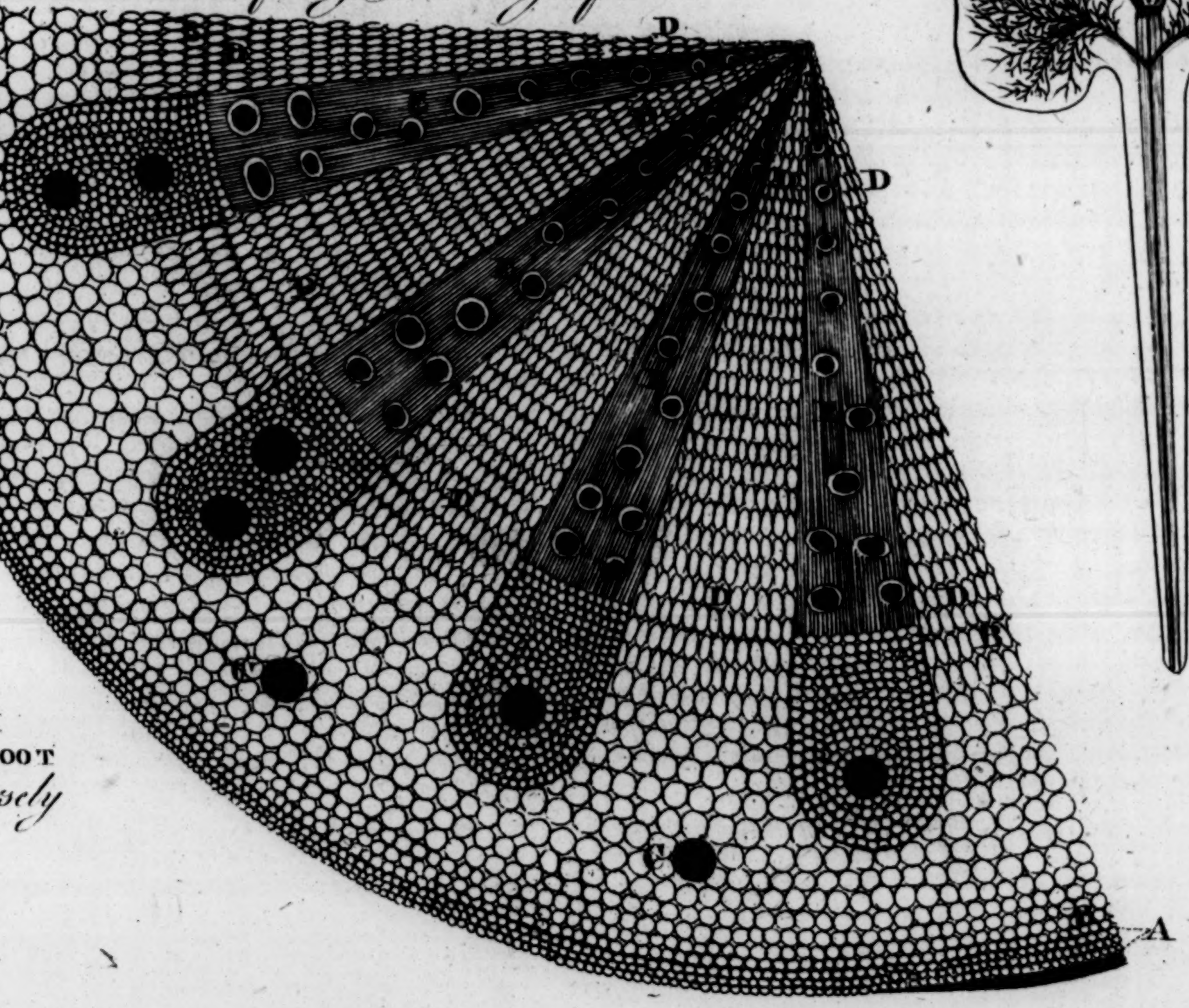
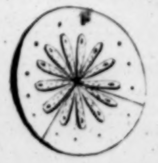


Fig. 9. WORMWOOD ROOT cut transversely



A Bell Sculpt

3 MA 53

the bark, and the inſertions of the wood. The quantity of pith is various in different plants. Inſtead of being increaſed every year like the wood, it is annually diminiſhed, its veſſels drying up, and aſſuming the appearance and ſtructure of wood; inſomuch, that in old trees there is ſcarce ſuch a thing as pith to be diſcerned.

A ring of ſap-veſſels are uſually placed at the outer edge of the pith, next the wood. In the pine, fig, and walnut, they are very large. The parenchyma of the pith is compoſed of ſmall cells or bladders, of the ſame kind with thoſe of the bark, only of a larger ſize. The general figure of theſe bladders is circular; though in ſome plants, as the thiſtle and borage, they are angular. Though the pith is originally one connected chain of bladders; yet as the plant grows old, they ſhrivel, and open in different directions. In the walnut, after a certain age, it appears in the form of a regular tranſverſe hollow diviſion. In ſome plants, it is altogether wanting; in others, as the ſonchus, nettle, &c. there is only a tranſverſe partition of it at every joint. Many other varieties might be mentioned; but theſe muſt be left to the obſervation of the reader.

Plate CCXL.

Fig. 1. A tranſverſe ſection of a branch of aſh, as it appears to the eye.

Fig. 2. The ſame ſection magnified. A A, the bark. B B B, an arched ring of ſap-veſſels next the ſkin. CCC, the parenchyma of the bark with its cells, and another arched ring of ſap-veſſels. DD, a circular line of lymph-ducts immediately below the above arched ring. E E, the wood. F, the firſt year's growth. G, the ſecond. H, the third year's growth. I I I, the true wood. K K, The great air-veſſels. L L, the leſſer ones. M M M, the parenchymatous inſertions of the bark repreſented by the white rays. NO, the pith, with its bladders or cells.

4. *Of the Leaves.*] The leaves of plants conſiſt of the ſame ſubſtance with that of the trunk. They are full of nerves, or woody portions, running in all directions, and branching out into innumerable ſmall threads, interwoven with the parenchyma like fine lace or gauze.

The ſkin of the leaf, like that of an animal, is full of pores, which both ſerve for perſpiration, and for the abſorption of dews, air, &c. Theſe pores, or orifices, differ both in ſhape and magnitude in different plants, which is the cauſe of that variety of texture or grain peculiar to every plant.

The pulpy or parenchymatous part conſiſts of very minute fibres, wound up into ſmall cells or bladders. Theſe cells are of various ſizes in the ſame leaf.

All leaves, of whatever figure, have a marginal fibre, by which all the reſt are bounded. The particular ſhape of this fibre determines the figure of the leaf.

The veſſels of leaves have the appearance of inoſculating; but, when examined by the microſcope, they are found only to be interwoven, or laid along each other.

What are called *air-veſſels*, or thoſe which carry no ſap, are viſible even to the naked eye in ſome leaves. When a leaf is ſlowly broke, they appear like ſmall woolly fibres, connected to both ends of the broken piece.

Plate CCXLI.

Fig. 1. The appearance of the air-veſſels to the eye, in a vine-leaf drawn gently aſunder.

Fig. 2. A ſmall piece cut off that leaf.

Fig. 3. The ſame piece magnified, in which the veſſels have the appearance of a ſcrew.

Fig. 4. The appearance of theſe veſſels as they exiſt in the leaf before they are ſtretched out.

5. *Of the Flower.*] It is needleſs here to mention any thing of the texture, or of the veſſels, &c. of flowers, as they are pretty ſimilar to thoſe of the leaf. It would be foreign to our preſent purpoſe, to take any notice of the characters and diſtinctions of flowers. Theſe belong to the ſcience of BOTANY, to which the reader is referred.

There is one curious fact, however, which muſt not be omitted, *viz.* That every flower is perfectly formed in its parts many months before it appears outwardly; that is, the flowers which appear this year, are not, properly ſpeaking, the flowers of this year, but of the laſt. For example, mezereon generally flowers in January; but theſe flowers were completely formed in the month of Auguſt preceding. Of this fact any one may ſatisfy himſelf by ſeparating the coats of a tulip-root about the beginning of September; and he will find that the two innermoſt form a kind of cell, in the centre of which ſtands the young flower, which is not to make its appearance till the following April or May. Fig. 5. exhibits a view of the tulip-root when diſſected in September, with the young flower towards the bottom.

6. *Of the Fruit.*] In deſcribing the ſtructure of fruits, a few examples ſhall be taken from ſuch as are moſt generally known.

A *pear*, beſides the ſkin, which is a production of the ſkin of the bark, conſiſts of a double parenchyma or pulp, ſap, and air-veſſels, calculary, and acetary.

The outer parenchyma is the ſame ſubſtance continued from the bark, only its bladders are larger and more ſucculent.

It is every where interſperſed with ſmall globules or grains, and the bladders reſpect theſe grains as a kind of centres, every grain being the centre of a number of bladders. The ſap and air-veſſels in this pulp are extremely ſmall.

Next the core is the inner pulp or parenchyma, which conſiſts of bladders of the ſame kind with the outer, only larger and more oblong, correſponding to thoſe of the pulp, from which it ſeems to be derived. This inner pulp is much ſourer than the other, and has none of the ſmall grains interſperſed thro' it; and hence it has got the name of *acetary*.

Between the acetary and outer pulp, the globules or grains begin to grow larger, and gradually unite into a hard ſtony body, eſpecially towards the corculum, or ſtool of the fruit; and from this circumſtance it has been called the *calculary*.

Theſe grains are not derived from any of the organical parts of the tree; but ſeem rather to be a kind of concretions precipitated from the ſap, ſimilar to the precipitations from wine, urine, and other liquors.

The core is a roundiſh cavity in the centre of the pear, lined with a hard woody membrane, in which the ſeed is incloſed. At the bottom of the core there is a ſmall duct or canal, which runs up to the top of the pear; this canal allows the air to get into the core, for the purpoſe of drying and ripening the ſeeds.

Plate CCXLII. Fig. 1. A tranſverſe ſection of a pear, as it appears to the naked eye. A, the ſkin, and a ring of ſap-veſſels. B, the outer parenchyma, or pulp, with its veſſels, and ligneous fibres interſperſed. C, the inner parenchyma, or acetary, with its veſſels, which are larger than the outer one. D, the core and ſeeds.

Fig. 2. a piece cut off fig. 1.

Fig. 3. is fig. 2. magnified. A A A, the ſmall grains or globules, with the veſſels radiated from them.

Fig. 4. A longitudinal ſection of the pear, ſhewing a different view of the ſame parts with thoſe of fig. 1. A, the channel, or duct, which runs from the top of the pear to the bottom of the core.

In a *lemon*, the parenchyma appears in three different forms. The parenchyma of the rind is of a coarſe texture, being compoſed of thick fibres, woven into large bladders. Thoſe neareſt the ſurface contain the eſſential oil of the fruit, which burſts into a flame when the ſkin is ſqueezed over a candle. From this outmoſt parenchyma nine or ten inſertions or lamellæ are produced, which run between as many portions of the pulp, and unite into one body in the centre of the fruit, which correſponds to the pith in trunks or roots. At the bottom and top of the lemon, this pith evidently joins with the rind, without the intervention of any lamellæ. This circumſtance ſhows, that the pith and bark are actually connected in the trunk and roots of plants, though it is difficult to demonſtrate the connection, on account of the cloſeneſs of their texture, and the minuteneſs of their fibres. Many veſſels are diſperſed thro' the whole of this parenchyma; but the largeſt ones ſtand on the inner edge of the rind, and the outer edge of the pith, juſt at the two extremities of each lamella.

The ſecond kind of parenchyma is placed between the rind and the pith; is divided into diſtinct bodies by the lamellæ; and each of theſe bodies forms a large bag.

Theſe bags contain a third parenchyma, which is a cluſter of ſmaller bags, diſtinct and unconnected with each other, having a ſmall ſtalk by which they are fixed to the large bag. Within each of theſe ſmall bags are many hundreds of bladders, compoſed of extremely minute fibres. Theſe bladders contain the acid juice of the lemon.

Plate CCXL. Fig. 3. A longitudinal ſection of a lemon. A A A, the rind with the veſſels which contain the eſſential oil. B B, the ſubſtance correſponding to the pith, formed by the union of the lamellæ, or inſertions. C C, its continuation and connection with the rind, independent of the inſertions.

Fig. 4. A tranſverſe ſection of the lemon. B B B, &c. the nine pulpy bags, or ſecond parenchyma, placed between the rind and the pith; and the cluſter of ſmall bags, which contain the acid juice, incloſed in the large ones. C C, the large veſſels that ſurround the pith. DD, two of the large bags laid open, ſhowing the ſeeds, and their connection with the lamellæ or membranes which form the large bags.

Of the Perſpiration of PLANTS, *and the quantity of moiſture daily imbibed by them.*—Theſe curious particulars have been determined with great accuracy by Dr Hales. The method he took to accompliſh his purpoſe was as follows.—In the month of July, commonly the warmeſt ſeaſon of the year, he took a large ſun-flower three feet and an half high, which had been purpoſely planted in a flower-pot when young. He covered the pot with thin milled lead, leaving only a ſmall hole to preſerve a communication with the external air, and another by which he might occaſionally ſupply the plant with water. Into the former he inſerted a glaſs tube nine inches long, and another ſhorter tube into the hole by which he poured in the water; and the latter was kept cloſe ſtopped with a cork, except when there was occaſion to uſe it. The holes in the bottom of the pot were alſo ſtopped up with corks, and all the crevices ſhut with cement.—Things being thus prepared, the pot and plant were weighed for 15 ſeveral days; after which the plant was cut off cloſe to the leaden plate, and the ſtump well covered with cement. By weighing, he found that there perſpired through the unglazed porous pot two ounces every 12 hours; which being allowed for in the daily weighing of the plant and pot, the greateſt perſpiration, in a warm day, was found to be one pound 14 ounces; the middle rate of perſpiration, one pound four ounces: the perſpiration of a dry warm night without any ſenſible dew, was about three ounces; but when there was any ſenſible though ſmall dew, the perſpiration was nothing; and when there was a large dew, or ſome little rain in the night, the plant and pot was increaſed in weight two or three ounces.

In order to know what quantity was perſpired from a ſquare inch of ſurface, our author cut off all the leaves of the plant, and laid them in five ſeveral parcels, according to their ſeveral ſizes; and then meaſured the ſurface of a leaf of each parcel, by laying over it a large lattice made with threads, in which each of the little ſquares were $\frac{1}{4}$ of an inch; by numbering of which, he had the ſurface of the leaves in ſquare inches; which, multiplied by the number of leaves in the correſponding parcels, gave the area of all the leaves. By this method he found the ſurface of the whole plant above ground to be 5616 ſquare inches, or 39 ſquare feet. He dug up another ſun-flower of nearly the ſame ſize, which had eight main roots, reaching 15 inches deep and ſideways, from the ſtem. It had beſides a very thick buſh of lateral roots from the eight main roots, extending every way in a hemiſphere about nine inches from the ſtem and main roots. In order to eſtimate the length of all the roots, he took one of the main roots with its laterals, and meaſured and weighed them; and then weighed the other ſeven with their laterals; by which means he found the ſum of all their lengths to be 1448 feet. Suppoſing then the periphery of theſe roots at a medium to be 0.131 of an inch, then their ſurface will be 2276 ſquare inches, or 15.8 ſquare feet; that is, equal to 0.4 of the ſurface of the plant above ground. From calculations drawn from theſe obſervations it appears, that a ſquare inch of the upper ſurface of this plant perſpires $\frac{1}{165}$ part of an inch in a day and a night; and that a ſquare inch of the ſurface underground imbibed $\frac{1}{67}$ of an inch in the ſame time.

Plate CCXL.

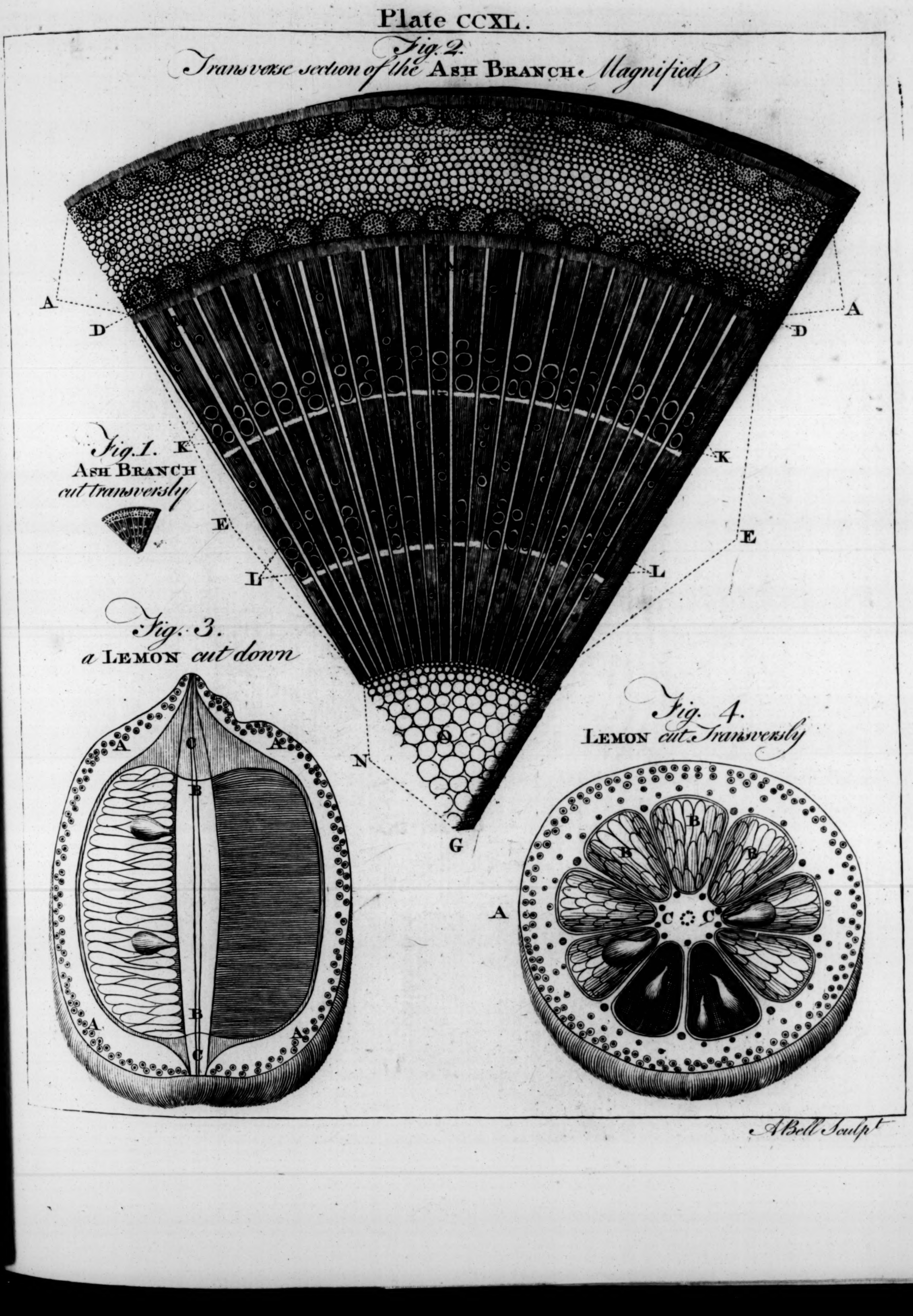


Fig. 2. *Transverse section of the* **Ash Branch** *Magnified*

Fig. 1. **Ash Branch** *cut transversly*

Fig. 3. *a* **Lemon** *cut down*

Fig. 4. **Lemon** *cut Transversly*

A
A
D
D
C
C
N
K
K
E
E
L
L
N
O
G
A
A
C
B
B
C
A
A
A
B
B
B
C
C

A Bell Sculp^t

3 MA 55

Plate CCXLI.

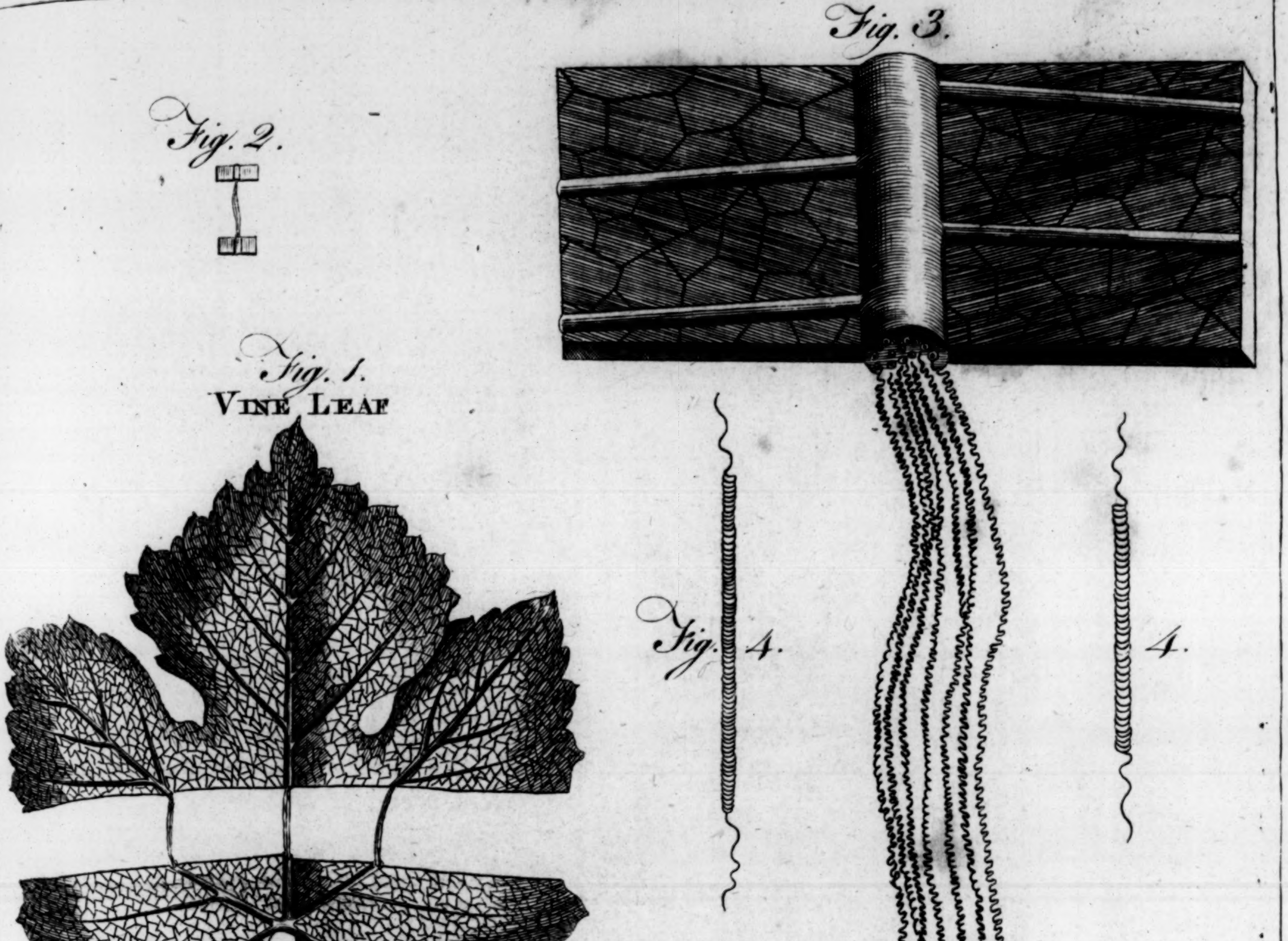


Fig. 3.
Fig. 2.
Fig. 1.
VINE LEAF
Fig. 4.
4.
Fig. 5.
TULIP ROOT
1.

A Bell Sculp^t.

3 MA 53

Plate CCXLII.

Fig. 1.
PEAR
Cut Transversely

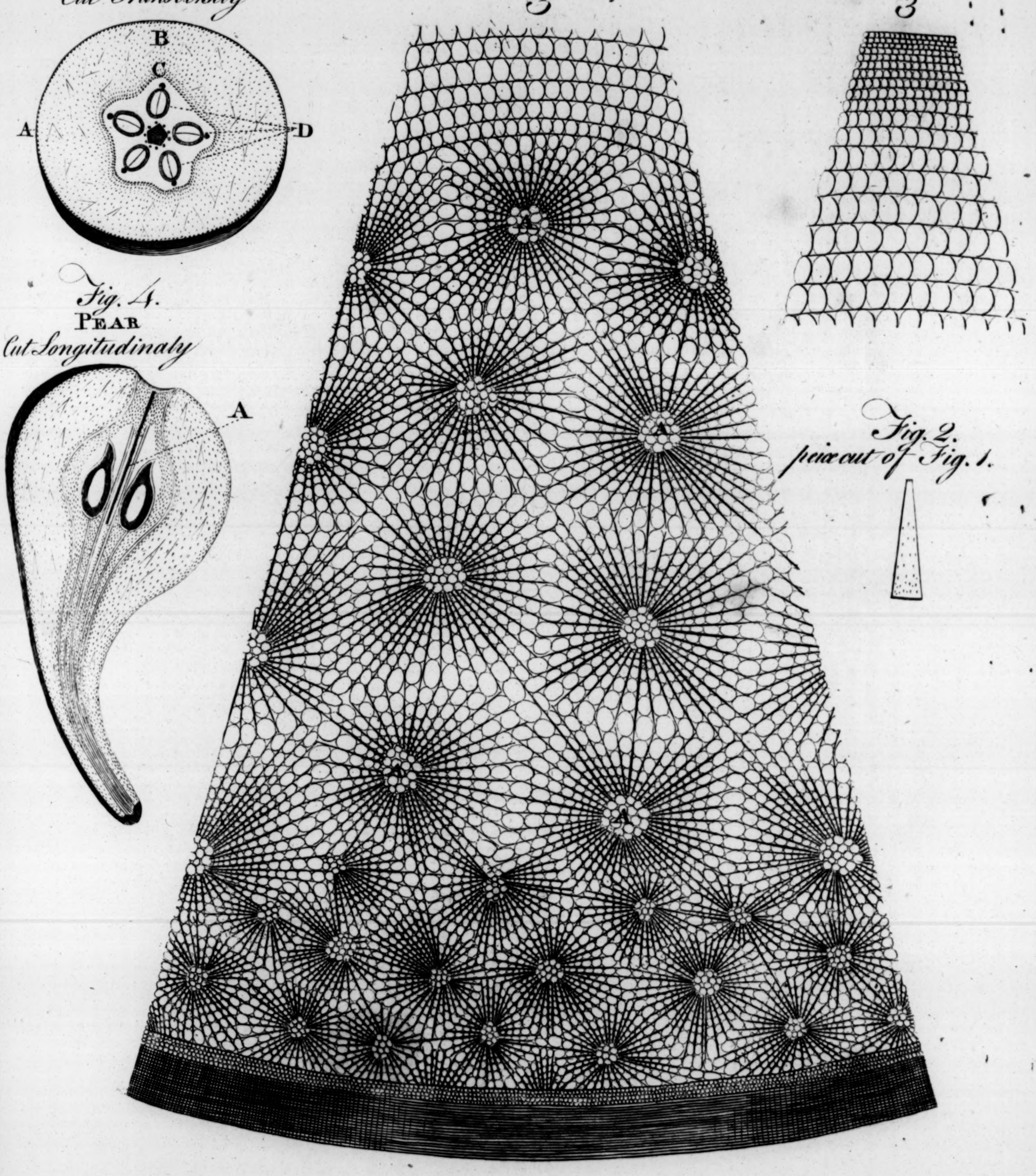


Fig. 4.
PEAR
Cut Longitudinaly

Fig. 3. is Fig. 2. Magnified

3

3

Fig. 2.
peice out of Fig. 1.

A Bell. Sculp.t

3 MA 53

The quantity perſpired by different plants, however, is by no means equal. A vine-leaf perſpires only $\frac{1}{191}$ of an inch in 12 hours; a cabbage perſpires $\frac{1}{80}$ of an inch in the ſame time; an apple-tree $\frac{1}{102}$ in 12 hours; and a lemon $\frac{1}{248}$ in 12 hours.

Of the Circulation of the Sap in PLANTS.—Concerning this there have been great diſputes; ſome maintaining, that the vegetable ſap has a circulation analogous to the blood of animals; while others affirm, that it only aſcends in the day-time, and deſcends again in the night. In favour of the doctrine of circulation it has been urged, that upon making a tranſverſe inciſion into the trunk of a tree, the juice which runs out, proceeds in greater quantity from the upper than the lower part; and the ſwelling in the upper lip is alſo much greater than in the lower. It appears, however, that when two ſimilar inciſions are made, one near the top, and the other near the root, the latter expends much more ſap than the former. Hence it is concluded, that the juice aſcends by one ſet of veſſels, and deſcends by another. But, in order to ſhew this clearly, it would be neceſſary, firſt to prove, that there is in plants, as in animals, ſome kind of centre from which the circulation begins, and to which it returns: but no ſuch centre has been diſcovered by any naturaliſt; neither is there is the leaſt proviſion apparently made by nature whereby the ſap might be prevented from deſcending in the very ſame veſſels thro' which it aſcends. In the lacteal veſſels of animals, which we may ſuppoſe to be analogous to the roots of vegetables, there are valves which effectually prevent the chyle when once abſorbed from returning into the inteſtines; but no ſuch thing is obſerved in the veſſels of vegetables; whence it muſt be very probable, that when the propelling force ceaſes, the juice deſcends by the very ſame veſſels through which it aſcended. This matter, however, has been cleared up almoſt as well as the nature of the ſubject will admit of by the experiments of Dr Hales †. Theſe experiments are ſo numerous, that for a particular account of them we muſt refer to the work itſelf; however, his reaſoning againſt the circulation of the ſap will be ſufficiently intelligible without them. "We ſee, (ſays he), in many of the foregoing experiments, what quantities of moiſture trees daily imbibe and perſpire: now the celerity of the ſap muſt be very great, if that quantity of moiſture muſt, moſt of it, aſcend to the top of the tree, then deſcend, and aſcend again, before it is carried off by perſpiration.

egetable
ticks,
. i.
142.

"The defect of a circulation in vegetables ſeems in ſome meaſure to be ſupplied by the much greater quantity of liquor, which the vegetable takes in, than the animal, whereby its motion is accelerated; for we find the ſun-flower, bulk for bulk, imbibes and perſpires 17 times more freſh liquor than a man, every 24 hours.

"Beſides, Nature's great aim in vegetables being only that the vegetable life be carried on and maintained, there was no occaſion to give its ſap the rapid motion which was neceſſary for the blood of animals.

"In animals, it is the heart which ſets the blood in motion, and makes it continually circulate; but in vegetables we can diſcover no other cauſe of the ſap's motion, but the ſtrong attraction of the capillary ſap-veſſels, aſſiſted by the briſk undulations and vibrations cauſed by the ſun's warmth, whereby the ſap is carried up to the top of the talleſt trees, and is there perſpired off thro' the leaves: but when the ſurface of the tree is greatly diminiſhed by the loſs of its leaves, then alſo the perſpiration and motion of the ſap is proportionably diminiſhed, as is plain from many of the foregoing experiments: ſo that the aſcending velocity of the ſap is principally accelerated by the plentiful perſpiration of the leaves, thereby making room for the fine capillary veſſels to exert their vaſtly attracting power, which perſpiration is effected by the briſk rareſying vibrations of warmth; a power that does not ſeem to be any ways well adapted to make the ſap deſcend from the tops of vegetables by different veſſels to the root.

"If the ſap circulated, it muſt needs have been ſeen deſcending from the upper part of large gaſhes cut in branches ſet in water, and with columns of water preſſing on their bottoms in long glaſs tubes. In both which caſes, it is certain that great quantities of water paſſed through the ſtem, ſo that it muſt needs have been ſeen deſcending, if the return of the ſap downwards were by truſion or pulſion, whereby the blood in animals is returned through the veins to the heart: and that pulſion, if there were any, muſt neceſſarily be exerted with prodigious force, to be able to drive the ſap through the finer capillaries. So that, if there be a return of the ſap downwards, it muſt be by attraction, and that a very powerful one, as we may ſee by many of theſe experiments. But it is hard to conceive, what and where that power is, which can be equivalent to that proviſion nature has made for the aſcent of the ſap in conſequence of the great perſpiration of the leaves.

"The inſtances of the jeſſamine-tree, and of the paſſion-tree, have been looked upon as ſtrong proofs of the circulation of the ſap, becauſe their branches, which were far below the inoculated bud, were gilded: but we have many viſible proofs in the vine, and other bleeding trees, of the ſap's receding back, and puſhing forwards alternately, at different times of the day and night. And there is great reaſon to think, that the ſap of all other trees has ſuch an alternate, receding, and progreſſive motion, occaſioned by the alternacies of day and night, warm and cool, moiſt and dry.

"For the ſap in all vegetables does probably recede in ſome meaſure from the tops of the branches, as the ſun leaves them; becauſe its rareſying power then ceaſing, the greatly rarefied ſap, and air mixed with it, will condenſe, and take up leſs room than they did, and the dew and rain will then be ſtrongly imbibed by the leaves; whereby the body and branches of the vegetable which have been much exhauſted by the great evaporation of the day, may at night imbibe ſap and dew from the leaves; for by ſeveral experiments, plants were found to increaſe conſiderably in weight, in dewy and moiſt nights. And by other experiments on the vine, it was found, that the trunk and branches of vines were always in an imbibing ſtate, cauſed by the great perſpiration of the leaves, except in the bleeding ſeaſon; but when at night that perſpiring power ceaſes, then the contrary imbibing power will prevail, and draw the ſap and dew from the leaves, as well as moiſture from the roots.

"And we have a farther proof of this by fixing mercurial gages to the ſtems of ſeveral trees which do not bleed, whereby it is found that they are always in a ſtrongly imbibing ſtate, by drawing up the mercury ſeveral inches: whence it is eaſy to conceive, how ſome of the particles of the gilded bud in the inoculated jeſſamine may be abſorbed by it, and thereby communicate their gilding miaſma to the ſap of other branches; eſpecially when, ſome months after the inoculation, the ſtock of the inoculated jeſſamine is cut off a little above the bud; whereby the ſtock, which was the counteracting part to the ſtem, being taken away, the ſtem attracts more vigorouſly from the bud.

"Another argument for the circulation of the ſap, is that ſome ſorts of the graffs will infect and canker the ſtocks they are grafted on: but by mercurial gages fixed to freſh-cut ſtems of trees, it is evident that thoſe ſtems were in a ſtrongly imbibing ſtate; and conſequently the cankered ſtocks might very likely draw ſap from the graff, as well as the graff alternately from the ſtock; juſt in the ſame manner as leaves and branches do from each other, in the viciſſitudes of day and night. And this imbibing power of the ſtock is ſo great, where only ſome of the branches of a tree are grafted, that the remaining branches of the ſtock will, by their ſtrong attraction, ſtarve thoſe graffs; for which reaſon it is uſual to cut off the greateſt part of the branches of the ſtock, leaving only a few ſmall ones to draw up the ſap.

"The inſtance of the ilex grafted upon the Engliſh oak, ſeems to afford a very conſiderable argument againſt a circulation. For, if there were a free uniform circulation of the ſap through the oak and ilex, why ſhould the leaves of the oak fall in winter, and not thoſe of the Ilex?

"Another argument againſt an uniform circulation of the ſap in trees, as in animals, may be drawn from an experiment where it was found by the three mercurial gages fixed to the ſame vine, that while ſome of its branches changed their ſtate of protruding ſap into a ſtate of imbibing, others continued protruding ſap one nine, and the other thirteen days longer."

To this reaſoning of Dr Hales we ſhall ſubjoin an experiment made by Mr Muſtel of the Academy of Sciences at Rouen, which ſeems deciſive againſt the doctrine of circulation. His account of it is as follows.—"On the 12th of January I placed ſeveral ſhrubs in pots againſt the windows of my hot-houſe, ſome within the houſe, and others without it. Thro' holes made for this purpoſe in the panes of glaſs, I paſſed a branch of each of the ſhrubs, ſo that thoſe on the inſide had a branch without, and thoſe on the outſide one within; after this, I took care that the holes ſhould be exactly cloſed and luted. This inverſe experiment, I thought, if followed cloſely, could not fail affording ſufficient points of compariſon, to trace out the differences, by the obſervation of the effects.

"The 20th of January, a week after this diſpoſition, all the branches that were in the hot-houſe began to diſcloſe their buds. In the beginning of February there appeared leaves; and towards the end of it, ſhoots of a conſiderable length, which preſented the young flowers. A dwarf apple-tree, and ſeveral roſe-trees, being ſubmitted to the ſame experiment, ſhewed the ſame appearance then as they commonly put on in May; in ſhort, all the branches which were within the hot-houſe, and conſequently kept in the warm air, were green at the end of February, and had their ſhoots in great forwardneſs. Very different were thoſe parts of the ſame tree which were without and expoſed to the cold. None of theſe gave the leaſt ſign of vegetation; and the froſt, which was intenſe at that time, broke a roſe-pot placed on the outſide, and killed ſome of the branches of that very tree which, on the inſide, was every day putting forth more and more ſhoots, leaves, and buds, ſo that it was in full vegetation on one ſide, whilſt frozen on the other.

"The continuance of the froſt occaſioned no change in any of the internal branches. They all continued in a very briſk and verdant ſtate, as if they did not belong to the tree which, on the outſide, appeared in the ſtate of the greateſt ſuffering. On the 15th of March, notwithſtanding the ſeverity of the ſeaſon, all was in full bloom. The apple-tree had its root, its ſtem, and part of its branches, in the hot-houſe. Theſe branches were covered with leaves and flowers; but the branches of the ſame tree, which were carried on the outſide, and expoſed to the cold air, did not in the leaſt partake of the activity of the reſt, but were abſolutely in the ſame ſtate which all trees are in during winter. A roſe-tree, in the ſame poſition, ſhowed long ſhoots with leaves and buds; it had even ſhot a vigorous branch upon its ſtalk; whilſt a branch which paſſed through, to the outſide, had not begun to produce any thing, but was in the ſame ſtate with other roſe-trees left in the ground. This branch is four lines in diameter, and 18 inches high.

"The roſe-tree on the outſide was in the ſame ſtate; but one of its branches drawn through to the inſide of the hot-houſe, was covered with leaves and roſe-buds. It was not without aſtoniſhment that I ſaw this branch ſhoot as briſkly as the roſe-tree which was in the hot-houſe, whoſe roots and ſtalk, expoſed as they were to the warm air, ought, it ſhould ſeem, to have made it get forwarder than a branch belonging to a tree, whoſe roots, trunk, and all its other branches, were at the very time froſt-nipped. Notwithſtanding this, the branch did not ſeem affected by the ſtate of its trunk; but the action of the heat upon it produced the ſame effect, as if the whole tree had been in the hot-houſe."

9. *Of the Food of* PLANTS.—This hath been ſo fully diſcuſſed under the article AGRICULTURE †, that it remains here only to take notice of thoſe diſcoveries which have been made ſince that article was written.—The method of making dephlogiſticated air *de novo*, or of depriving common air of its phlogiſton, is now ſo much improved, that numberleſs experiments may be made with it both on animals and vegetables. It is now pretty clear, that theſe two parts of the creation are a kind of counterbalance to one another; and the noxious parts or excrements of the one prove ſalutary food to the other. Thus, from the animal body continually paſs off certain effluvia, which *phlogiſticate* the air. Nothing can be more prejudicial to animal life than an accumulation of theſe effluvia: on the other hand, nothing is more favourable to vegetables than thoſe excrementitious effluvia of animals; and accordingly

† Part I. ſect. 1.

cordingly they greedily abſorb them from the earth, or from the air. With reſpect to the excrementitious parts of living vegetables, the caſe is reverſed. The pureſt dephlogiſticated air is the common effluvium which paſſes off from vegetables; and this, however favourable to animal life, is by no means ſo to vegetable; whence we have an additional proof of the doctrine concerning the food of plants delivered under the article AGRICULTURE.

With regard to the effects of other kinds of air on vegetation, a difference of ſome conſequence took place between Dr Prieſtley and Dr Percival. The former, in the firſt volume of his Experiments and Obſervations on Air, had aſſerted that fixed air is fatal to vegetable as well as to animal life. This opinion, however, was oppoſed by Dr Percival, and the contrary one adopted by Dr Hunter of York in the Georgical Eſſays, vol. V. The experiments related by theſe two gentlemen would indeed have been deciſive, had they been made with ſufficient accuracy. That this was the caſe, however, Dr Prieſtley denies, and in the third volume of his Treatiſe on Air has fully detected the miſtakes in Dr Percival's experiments; which proceeded in fact from his having uſed, not fixed air, but common air mixed with a ſmall quantity of fixed air. His experiments, when repeated with the pureſt fixed air, and in the moſt careful manner, were always attended with the ſame effect, namely, the killing of the plant.

It had alſo been aſſerted by Drs Percival and Hunter, that water impregnated with fixed air was more favourable to vegetation than ſimple water. This opinion was likewiſe examined by Dr Prieſtley: however, his experiments were indeciſive; but ſeem rather unfavourable to the uſe of fixed air than otherwiſe.

ſtley on vol. v.

Another very remarkable fact with regard to the food of plants has been diſcovered by Dr Prieſtley; namely, that ſome of them, ſuch as the willow, comfrey, and duck-weed, are nouriſhed by inflammable air. The firſt, he ſays, flouriſhes in this ſpecies of air ſo remarkably, that, "it may be ſaid to feed upon it with great avidity. This proceſs terminates in the change of what remains of the inflammable air into phlogiſticated air, and ſometimes into a ſpecies of air as good as common air, or even better; ſo that it muſt be the *inflammable principle* in the air that the plant takes, converting it, no doubt, into its proper nouriſhment."

art I. t. 1.

From what has been ſaid under the article PHLOGISTON, it muſt appear evident, that phlogiſticated air and inflammable air are cloſely allied to each other, ſo that it is no wonder they ſhould ſerve promiſcuouſly for the food of plants. The reaſon why both are not agreeable to all kinds of plants, moſt probably is the different quantity of phlogiſtic matter contained in them, and the different action of the latent fire they contain: for all plants do not require an equal quantity of nouriſhment; and ſuch as require but little, will be deſtroyed by having too much. The action of heat alſo is eſſentially neceſſary to vegetation, and it is probable that very much of this principle is abſorbed from the air by vegetables. But if the air by which plants are partly nouriſhed contains too much of that principle, it is very probable that they may be deſtroyed from this cauſe as well as the other; and thus inflammable air, which contains a vaſt quantity of that active principle, may deſtroy ſuch plants as grow in a dry ſoil, though it preſerves thoſe which grow in a wet one. See VEGETATION.

Diſſemination of PLANTS.—So great are the prolific powers of the vegetable kingdom, that a ſingle plant almoſt of any kind, if left to itſelf would, in a ſhort time, over-run the whole world. Indeed, ſuppoſing the plant to have been only a ſingle annual, with two ſeeds, it would, in 20 years, produce more than a million of its own ſpecies; what numbers then muſt have been produced by a plant whoſe ſeeds are ſo numerous as many of thoſe with which we are acquainted? From a ſingle root of the helenium (baſtard ſun-flower), Laurembergius reckons 3000 ſeeds; from the zea, 2000; which in Virginia muſt be doubled, becauſe the plant is there ſown twice a-year. In the helianthus (ſun-flower), 4000 ſeeds were obſerved by Camerarius; and in a poppy, Trevius numbered 3200 ſeeds: but of all others the tobacco ſeems to produce the greateſt number of ſeeds, 40320 being counted from a ſingle plant.

If nature had appointed no means for the ſcattering of theſe numerous ſeeds, but allowed them to fall down in the place where they grew, the young vegetables muſt of neceſſity have choaked one another as they grew up, and not a ſingle plant could have arrived at perfection. But ſo many ways are there appointed for the diſſemination of plants, that we not only ſee they not hinder each others growth, but a ſingle plant will in a ſhort time ſpread through different countries. The moſt evident means for this purpoſe are,

1. The force of the air.—That the efficacy of this may be the greater, nature has raiſed the ſeeds of vegetables upon ſtalks, ſo that the wind has thus an opportunity of acting upon them with the greater advantage. The ſeed-capſules alſo open at the apex, leſt the ripe ſeeds ſhould drop out without being widely diſperſed by the wind. Others are furniſhed with wings, and a pappous down, by which, after they come to maturity, they are carried up into the air, and have been known to fly the diſtance of 50 miles: 138 genera are found to have winged ſeeds.

2. In ſome plants the ſeed-veſſels open with violence when the ſeeds are ripe, and thus throw them to a conſiderable diſtance; and we have an enumeration of 50 genera whoſe ſeeds are thus diſperſed.

3. Other ſeeds are furniſhed with hooks, by which, when ripe; they adhere to the coats of animals, and are carried by them to their lodging places. Linnæus reckons 50 genera armed in thus manner.

4. Many ſeeds are diſperſed by means of birds, and other animals; who pick up the berries, and afterwards eject the ſeeds uninjured. Thus the fox diſſeminates the privet, and man many ſpecies of fruit. The plants found growing upon walls and houſes, on the tops of high rocks, &c. are moſtly brought there by birds; and it is univerſally known, that by manuring a field with new dung, innumerable weeds will ſpring up, which did not exiſt there before: 193 ſpecies are reckoned up which may be diſſeminated in this manner.

5. The growth of other ſeeds is promoted by ani-

mals in a different way. While ſome are eaten, others are ſcattered and trodden into the ground by them. The ſquirrel gnaws the cones of the pine, and many of the ſeeds fall out. When the loxica eats off their bark, almoſt his only food, many of their ſeeds are committed to the earth, or mixed in the moraſs with moſs, where he had retired. The glandularia, when ſhe hides up her nuts, often forgets them, and they ſtrike root. The ſame is obſervable of the walnut; mice collect and bury great quantities of them, and being afterwards killed by different animals, the nuts germinate.

6. We are aſtoniſhed to find moſſes, fungi, byſſus, and mucor, growing every-where; but it is for want of reflecting that their ſeeds are ſo minute that they are almoſt inviſible to the naked eye. They float in the air like atoms, and are dropped every-where, but grow only in thoſe places where there was no vegetation before, and hence we find the ſame moſſes in North America and in Europe.

Amœnit. Academ.

7. Seeds are alſo diſperſed by the ocean, and by rivers. "In Lapland, (ſays Linnæus), we ſee the moſt evident proofs how far rivers contribute to depoſit the ſeeds of plants. I have ſeen Alpine plants growing upon their ſhores frequently 36 miles diſtant from the Alps; for their ſeeds falling into the rivers, and being carried along and left by the ſtream, take root there.—We may gather likewiſe from many circumſtances how much the ſea furthers this buſineſs.—In Roſlagia, the iſland of Græſœa, Oeland, Gothland, and the ſhores of Scania, there are many foreign and German plants not yet naturalized in Sweden. The centaury is a German plant, whoſe ſeeds being carried by the wind into the ſea, the waves landed this foreigner upon the coaſts of Sweden. I was aſtoniſhed to ſee the veronica maritima, a German plant, growing at Tornea, which hitherto had been found only in Græſœa: the ſea was the vehicle by which this plant was tranſported thither from Germany; or poſſibly it was brought from Germany to Græſœa, and from thence to Tornea. Many have imagined, but erroneouſly, that ſeed corrupts in water, and loſes its principle of vegetation. Water at the bottom of the ſea is ſeldom warm enough to deſtroy ſeeds; we have ſeen water cover the ſurface of a field for a whole winter, while the ſeed which it contained remained unhurt, unleſs at the beginning of ſpring the waters were let down ſo low by drains, that the warmth of the ſun-beams reached to the bottom. Then the ſeeds germinate, but preſently become putreſcent; ſo that for the reſt of the year the earth remains naked and barren. Rain and ſhowers carry ſeeds into the cracks of the earth, ſtreams, and rivers; which laſt, conveying them to a diſtance from their native places, plant them in a foreign ſoil."

8. Laſtly, ſome ſeeds aſſiſt their projection to a diſtance in a very ſurpriſing manner. The crupina, a ſpecies of centaury, has its ſeeds covered over with erect briſtles, by whoſe aſſiſtance it creeps and moves about in ſuch a manner, that it is by no means to be kept in the hand. If you confine one of them between the ſtocking and the foot, it creeps out either at the ſleeve or neck-band, travelling over the whole body. If the bearded oat, after harveſt, be left with other grain in the barn, it extricates itſelf from the glume, nor does it ſtop in its progreſs till it gets to the walls of the building. Hence, ſays Linnæus, the Dalecarlian, after he has cut and carried it into the barn, in a few days finds all the glumes empty, and the oats ſeparate from them; for every oat has a ſpiral ariſta or beard annexed to it, which is contracted in wet, and extended in dry weather. When the ſpiral is contracted, it drags the oat along with it: the ariſta being bearded with minute hairs pointing downward, the grain neceſſarily follows it; but when it expands again, the oat does not go back to its former place, the roughneſs of the beard the contrary way preventing its return. If you take the ſeeds of equiſetum, or fern, theſe being laid upon paper, and viewed in a microſcope, will be ſeen to leap over any obſtacle as if they had feet; by which they are ſeparated and diſperſed one from another; ſo that a perſon ignorant of this property, would pronounce theſe ſeeds to be ſo many mites or ſmall inſects. See NATURAL *Hiſtory*, Sect. III.

PLANTS *growing on Animals.* See INSECTS *giving root to Plants.*

Method of Drying and Preſerving PLANTS *for Botaniſts.* Many methods have been deviſed for the preſervation of plants; we ſhall relate only thoſe that have been found moſt ſucceſsful.

Withering's Botanical Arrangement, Introd. p. xlviii.

Firſt prepare a preſs, which a workman will make by the following directions. Take two planks, of a wood not liable to warp. The planks muſt be two inches thick, 18 inches long, and 12 inches broad. Get four male and four female ſcrews, ſuch as are commonly uſed for ſecuring ſaſh-windows. Let the four female ſcrews be let into the four corners of one of the planks, and correſponding holes made through the four corners of the other plank for the male ſcrews to paſs through, ſo as to allow the two planks to be ſcrewed tightly together. It will not be amiſs to face the bearing of the male ſcrews upon the wood with iron plates; and if the iron plates went acroſs from corner to corner of the wood, it would be a good ſecurity againſt the warping.

Secondly, get half a dozen quires of large ſoft ſpongy paper, ſuch as the ſtationers call *bloſſom blotting paper* is the beſt, and a few ſheets of ſtrong paſteboard.

The plants you wiſh to preſerve ſhould be gathered in a dry day, after the ſun hath exhaled the dew; taking particular care to collect them in that ſtate wherein their generic and ſpecific characters are moſt conſpicuous. Carry them home in a tin-box nine inches long, four inches and a half wide, and one inch and a half deep. Get the box made of the thinneſt tinned iron that can be procured; and let the lid open upon hinges. If any thing happens to prevent the immediate uſe of the ſpecimens you have collected, they will be kept freſh two or three days in this box much better than by putting them in water. When you are going to preſerve them, ſuffer them to lie upon a table until they become limber; and then they ſhould be laid upon a paſteboard, as much as poſſible in their natural form, but at the ſame time with a particular view to their generic and ſpecific characters. For this purpoſe it will be adviſeable to ſeparate one of the flowers, and to diſplay the generic character. If the ſpecific character depends upon the flower or upon the root, a particular diſplay of that will be likewiſe neceſſary. When the plant is thus diſpoſed upon the paſteboard, cover it with eight or ten layers of ſpongy paper, and put it into the preſs. Exert only a ſmall degree of preſſure for the firſt two or three days; then examine it, unfold any unnatural plaits, rectify any miſtakes, and, after putting freſh paper over it, ſcrew the preſs harder. In about three days more ſeparate the plant from the paſteboard, if it is ſufficiently firm to allow of a change of place; put it upon a freſh paſteboard, and, covering it with freſh bloſſom-paper, let it remain in the preſs a few days longer. The preſs ſhould ſtand in the ſun-ſhine, or within the influence of a fire.

When it is perfectly dry, the uſual method is to faſten it down, with paſte or gum-water, on the right-hand inner page of a ſheet of large ſtrong writing-paper. It requires ſome dexterity to glue the plant neatly down, ſo that none of the gum or paſte may appear to defile the paper. Preſs it gently again for a day or two, with a half ſheet of bloſſom-paper betwixt the folds of the writing-paper. When it is quite dry, write upon the left-hand inner page of the paper the name of the plant; the ſpecific character; the place where, and the time when, it was found; and any other remarks you may think proper. Upon the back of the ſame page, near the fold of the paper, write the name of the plant, and then place it in your cabinet. A ſmall quantity of finely powdered arſenic, or corroſive ſublimate, is uſually mixed with the paſte or gum-water, to prevent the devaſtations of inſects; but the ſeeds of ſtaves-acre finely powdered will anſwer the ſame purpoſe, without being liable to corrode or to change the colour of the more delicate plants. Some people put the dried plants into the ſheets of writing-paper, without faſtening them down at all; and others only faſten them by means of ſmall ſlips of paper, paſted acroſs the ſtem or branches. Where the ſpecies of any genus are numerous, and the ſpecimens are ſmall, ſeveral of them may be put into one ſheet of paper.

Another more expeditious method is to take the plants out of the preſs after the firſt or ſecond day; let them remain upon the paſteboard; cover them with five or ſix leaves of bloſſom-paper, and iron them with a hot ſmoothing-iron until they are perfectly dry. If the iron is too hot, it will change the colours; but ſome people, taught by long practice, will ſucceed very happily. This is quite the beſt method to treat the orchis and other ſlimy mucilaginous plants.

Another method is to take the plants when freſh gathered, and, inſtead of putting them into the preſs, immediately to faſten them down to the paper with ſtrong gum-water: then dip a camel-hair pencil into ſpirit-varniſh, and varniſh the whole ſurface of the plant two or three times over. This method ſucceeds very well with plants that are readily laid flat, and it preſerves their colours better than any other. The ſpirit varniſh is made thus. To a quart of highly rectified ſpirit of wine, put five ounces of gum ſandarach; two ounces of maſtich in drops; one ounce of pale gum elemi, and one ounce of oil of ſpike-lavender. Let it ſtand in a warm place, and ſhake it frequently to expedite the ſolution of the gums.

Where no better convenience can be had, the ſpecimens may be diſpoſed ſyſtematically in a large folio book; but a vegetable cabinet is upon all accounts more eligible. In Plate CCXLVI. there is a ſection of a cabinet, in the true proportions it ought to be made, for containing a complete collection of Britiſh plants. By the aſſiſtance of this drawing, and the adjoining ſcale, a workman will readily make one. The drawers muſt have backs and ſides, but no other front than a ſmall ledge. Each drawer will be 14 inches wide, and 10 inches from the back to the front, after allowing half an inch for the thickneſs of the two ſides, and a quarter of an inch for the thickneſs of the back. The ſides of the drawers, in the part next the front, muſt be ſloped off in a ſerpentine line, ſomething like what the workmen call an *ogee*. The bottoms of the drawers muſt be made to ſlide in grooves cut in the uprights, ſo that no ſpace may be loſt betwixt drawer and drawer. After allowing a quarter of an inch for the thickneſs of the bottom of each drawer, the clear perpendicular ſpace in each muſt be as in the following table.

I.	Two tenths of an inch.
II.	One inch and two tenths.
III.	Four inch. and ſix tenths.
IV.	Two inches and three tenths.
V.	Seven inches and eight tenths.
VI.	Two inches and two tenths.
VII.	Two tenths of an inch.
VIII.	One inch and four tenths.
IX.	Two tenths of an inch.
X.	Two inches and eight tenths.
XI.	One inch and two tenths.
XII.	Three inches and five tenths.
XIII.	Two inches and four tenths.
XIV.	Three inches and eight tenths.
XV.	Three inches and four tenths.
XVI.	One inch and three tenths.
XVII.	Two inches and eight tenths.
XVIII.	Six tenths of an inch.
XIX.	Ten inches.
XX.	One inch and nine tenths.
XXI.	Four inches and four tenths.
XXII.	Two inches and ſix tenths.
XXIII.	One inch and two tenths.
XXIV.	Seventeen inches.

This cabinet ſhuts up with two doors in front; and the whole may ſtand upon a baſe, containing a few drawers for the reception of duplicates and papers.

Moving PLANT. See HEDYSARUM.

Senſitive PLANT. See MIMOSA and SENSITIVE *Plant*.

PLANT-*Lice*, *Vine-fretters*, or *Pucerons*. See APHIS.

PLANTA, a PLANT. See PLANT.

PLANTA *Fœmineæ*, a female plant, is one which bears female flowers only. It is oppoſed to a *male* plant, which bears only male flowers; and to an *androgynous* one, which bears flowers of both ſexes.—Female plants are produced from the ſame ſeed with the male, and arrange themſelves under the claſs of diœcia in the ſexual method.

PLANTAGENET, the ſurname of the kings of England from Henry II. to Richard III. incluſive. Antiquarians are much at a loſs to account for the origin of this name; and the beſt derivation they can find for it is, that Fulk, the firſt earl of Anjou of that name, being ſtung with remorſe for ſome wicked action, went in pilgrimage to Jeruſalem as a work of atonement; where being ſoundly ſcourged with broom-twigs, which grew plentifully on the ſpot, he ever after took the ſurname of *Plantagenet*, or *broom-ſtalk*, which was retained by his noble poſterity.

PLANTAGO, PLANTAIN; a genus of the monogynia order, belonging to the tetrandria claſs of plants. To this genus Linnæus has joined the coronopus and pſyllium of Tournefort. The firſt of theſe is called *hartſhorn*, the latter *fleawort*. Of theſe there are ſeveral diſtinct ſpecies, and ſomo varieties; but as they are rarely cultivated in gardens, we ſhall not enumerate them here, and ſhall only mention ſuch of them as grow naturally in Britain. Of the plantain there are the following ſorts: The common broad-leaved plantain, called *weybread;* the great hoary plantain, or lambs-tongue; the narrow-leaved plantain, or ribwort: and the following varieties have alſo been found in England, which are accidental; the beſom-plantain and roſe-plantain. The plantains grow naturally in paſtures in moſt parts of England, and are frequently very troubleſome weeds. The common plantain, and ribwort plantain, are both uſed in medicine, and are ſo well known as to need no deſcription. They are ſaid to be ſlightly aſtringent; and the green leaves are commonly applied to freſh wounds by the common people.

Of the coronopus, or buckſhorn plantain, there are two varieties growing in England, viz. the common buckſhorn, which grows plentifully on heaths every where; and the narrow-leaved Welch ſort, which is found upon many of the Welch mountains. The firſt of theſe was formerly cultivated as a ſalad herb in gardens, but has been long baniſhed from thence for its rank diſagreeable flavour; it is ſometimes uſed in medicine.—There has been one ſpecies of pſyllium or fleawort found growing naturally in England, which is the ſort uſed in medicine. This was found in the earth thrown out of the bottom of the canals which were dug for the Chelſea water-works, where it grew in great plenty. The ſeeds of this muſt have been buried there ſome ages; for no perſon remembers any of the plants growing in that neighbourhood before. The ſeeds of this are ſometimes uſed, which are imported from the ſouth of France.

PLANTAIN. See Plantago.

Plantain-*Tree*. See Musa.

PLANTATION, in the Weſt Indies, denotes a ſpot of ground which a planter, or perſon arrived in a new colony, pitches on to cultivate for his own uſe, or is aſſigned for that purpoſe. However, the term *plantation* is often uſed in a term ſynonymous with colony. See Colony.

PLANTERSHIP, in a general ſenſe, the buſineſs of a planter.

Plantership, in the Weſt Indies, denotes the management of a ſugar plantation, including not only the cultivation of the cane, but the various proceſſes for the extraction of the ſugar, together with the making of ſugar-ſpirits. See Rum, Saccharum, and Sugar.

To effect a deſign ſo comprehenſive, it is neceſſary for a planter to underſtand every branch of the art preciſely, and to uſe the utmoſt attention and caution both in the laying down and executing of his plans. It is therefore the duty of a good planter to inſpect every part of his plantation with his own eyes; to place his proviſions, ſtores, and utenſils, in regular order, and in ſafe repoſitories; that by preſerving them in perfection, all kinds of waſte may be prevented.

But as negroes, cattle, mules, and horſes, are, as it were, the nerves of a ſugar-plantation, it is expedient to treat that ſubject with ſome accuracy.

Of Negroes, Cattle, &c.] In the firſt place, then, as it is the intereſt of every planter to preſerve his negroes in health and ſtrength; ſo every act of cruelty is not leſs repugnant to the maſter's real profit, than it is contrary to the laws of humanity: and if a manager conſiders his own eaſe, and his employer's intereſt, he will treat all negroes under his care with due benevolence; for good diſcipline is by no means inconſiſtent with humanity: on the contrary, it is evident from experience, that he who feeds his negroes well, proportions their labour to their age, ſex, and ſtrength, and treats them with kindneſs and good-nature, will reap a much larger product, and with infinitely more eaſe and ſelf-ſatisfaction, than the moſt cruel taſk-maſter, who ſtarves his negroes, or chaſtiſes them with undue ſeverity. Every planter then who wiſhes to grow rich with eaſe, muſt be a good œconomiſt; muſt feed his negroes with the moſt wholeſome food, ſufficient to preſerve them in health and vigour. Common experience points out the methods by which a planter may preſerve his people in health and ſtrength. Some of his moſt fruitful land ſhould be allotted to each negro in proportion to his family, and a ſufficient portion of time allowed for the cultivation of it; but becauſe ſuch allotment cannot in long droughts produce enough for his comfortable ſupport, it is the incumbent duty of a good planter to have always his ſtores well filled with Guinea corn, yams, or eddoes, beſides potatoes growing in regular ſucceſſion: for plenty begets cheerfulneſs of heart, as well as ſtrength of body; by which more work is effected in a day by the ſame hands, than in a week when enervated by want and ſeverity. Scanty meals may ſuſtain life; but it is evident, that more is requiſite to enable a negro, or any other perſon, to go through the neceſſary labours. He therefore who will reap plentifully, muſt plant great abundance of proviſions as well as ſugar-canes: and it is nature's œconomy ſo to fructify the ſoil by the growth of yams, plantains, and potatoes, as to yield better harveſts of ſugar, by that very means, than can be produced by many other arts of cultivation. Plantains are the principal ſupport of all the negroes at Jamaica; and are alſo much cultivated, at great expence of manure, in Barbadoes; but ought not to be ſolely depended upon in climates ſubject to hurricanes. A celebrated planter and œconomiſt of the laſt-mentioned iſland, who raiſed an immenſe fortune from very ſmall beginnings only by planting, affirmed, that he fed conſtantly at leaſt 300 negroes out of 12 acres of plantains. How that excellent produce came to be ſo long neglected in ſome of the iſlands, is hard to gueſs; but at preſent the neglect ſeems to be founded upon a vulgar error, that plantains cannot thrive in any other than low moiſt ſoils. In ſuch places (no doubt) they flouriſh moſt luxuriantly; but yet they thrive and bear fruit abundantly on mountains and in marſhes, and in the drieſt black mold upon marle or rocks, and even in ſharp gravely ſoils, as may be evinced by numberleſs inſtances.

Martin on Planterſhip.

However plenty of wholeſome food may be conducive to health, there are alſo other means, equally neceſſary to ſtrength and the longevity of negroes, well worth the planter's attention: and thoſe are, to chooſe airy dry ſituations for their houſes; and to obſerve frequently that they be kept clean, in good repair, and perfectly water-tight; for naſtineſs, and the inclemencies of weather, generate the moſt malignant diſeaſes.

lanterſhip.

If theſe houſes are ſituated alſo in regular order, and at due diſtances, the ſpaces may at once prevent general devaſtations by fire, and furniſh plenty of fruits and pot-herbs, to pleaſe an unvitiated palate, and to purify the blood. Thus then ought every planter to treat his negroes with tenderneſs and generoſity, that they may be induced to love and obey him out of mere gratitude, and become real good beings by the imitation of his behaviour; and therefore a good planter, for his own eaſe and happineſs, will be careful of ſetting a good example.

Having thus hinted the duties of a planter to his negroes, let the next care be of cattle, mules, and horſes. The planters of Barbadoes (who are perhaps the moſt ſkilful of all others, and exact to a nicety in calculations of profit and loſs) are, with reſpect to their cattle, the moſt remiſs of any in all the iſlands; as if the carriage of canes to the mill, and of plantation-produce to the market, was not as eſſential as any other branch of planterſhip. At Barbadoes, in particular, the care of theſe animals is of more importance; becauſe the ſoil, worn out by long culture, cannot yield any produce without plenty of dung. Some planters are nevertheleſs ſo ingeniouſly thrifty, as to carry their canes upon negroes heads; acting in that reſpect diametrically oppoſite to their own apparent intereſt, which cannot be ſerved more effectually than by ſaving the labour of human hands, in all caſes where the labour of brutes can be ſubſtituted; and for that end, no means of preſerving thoſe creatures in health and ſtrength ought to be neglected.

The firſt care therefore is to provide plenty and variety of food. In crop-time, profuſion of cane-tops may be had for the labour of carriage; but they will be more wholeſome and nutritious if tedded like hay by the ſun's heat, and ſweated by laying them in heaps a few days before they are eaten. In this ſeaſon of abundance, great ricks of cane-tops (the butt ends turned inwards) ſhould be made in the moſt convenient corner of each field, to ſupply the want of paſturage and other food: and theſe are very wholeſome if chopped into ſmall parts, and mixed ſometimes with common ſalt, or ſprinkled with melaſſes mixed with water: but yet the cattle require change of food to preſerve them in ſtrength; ſuch as Guinea corn, and a variety of graſs, which every ſoil produces with a little care in moiſt weather; and indeed this variety is found neceſſary in all climes.

But ſince that variety is not to be had during thoſe ſevere droughts to which hot climates are liable, and much leſs in thoſe ſmall iſlands which cannot furniſh large tracts of meadow-lands for hay, the only reſource is the fodder of cane-tops or tedded Guinea-corn leaves; which are very nutritious, and may be preſerved in perfection for more than a whole year, provided the tops or Guinea-corn are well tedded for three or four hot days as they lie ſpread in the field; and then, being tied into bundles or ſheaves, muſt lie in the hot ſun for three or four days more, when they may be fit to be put up into ricks. The beſt method of making them is in an oblong figure, about 30 feet in length, and 16 or 18 feet wide; ſeven feet high at the ſides, and from thence ſloping like the roof of an houſe, the ridge of which muſt be thatched very carefully; for the ſides may be ſecured from wet by placing the bundles with the butts upwards towards the ridge, in courſes, and lapping the upper over the lower courſe.

Planterſhip.

The beſt method of forming thoſe ricks, is to place the firſt courſe of bundles all over the baſe one way; the ſecond courſe reverſely; and ſo alternately till the rick be finiſhed.

When cattle are to be fed with this fodder, it muſt be obſerved to take down the bundles from the top, at the weſt end of the rick, to the bottom; for all theſe ricks muſt ſtand eaſt and weſt lengthwiſe, as well to ſecure them from being overturned by high winds, as for the convenience of preſerving them from wet, which cannot be done when ricks are made round. By this huſbandry, an herd of cattle may be kept in ſtrength, either in ſevere droughts, or in wet ſeaſons, when graſs is purgative: and thus the neceſſity or expence of large paſtures may be totally ſaved. The hay-knife uſed in England for cutting hay, anſwers for cutting ricks of tops.

The method of tedding Guinea-corn to make a kind of hay, will require a little explanation here. When Guinea corn is planted in May, and to be cut down in July, in order to bear ſeed that year, that cutting, tedded properly, will make an excellent hay, which cattle prefer to meadow-hay. In like manner, after Guinea corn has done bearing ſeed, the after-crop will furniſh a great abundance of that kind of fodder which will keep well in ricks for two or three years.

The next care of a planter is to provide ſhade for his cattle; either by trees where they are fed in the heat of the day, if his ſoil requires not dung; or by building a flat ſhade over the pen where cattle are confined for making it. That ſuch ſhades are eſſentially neceſſary to the well-being of all animals in hot weather, is apparent to every common obſerver, who cannot fail of ſeeing each creature forſaking the moſt luxuriant paſtures in the heat of the day, for the ſake of ſhade; thus convincing the owners by inſtinctive argument, that ſhade is almoſt as neceſſary to the well-being of the brute creatures, as food. Yet, notwithſtanding that demonſtration from the unerring courſe of nature, throughout all our iſlands (except in a very few inſtances) theſe poor creatures are expoſed to the ſcorching ſun-beams without mercy. Such inhuman neglect is not always ſo much the effect of inattention, as of a miſtaken notion that ſhades are impedimental to the making of much dung; but a flat ſhade covered with cane-traſh, may be ſo made as to let rain paſs through it, without admiſſion of ſun-beams. This will do for cattle; but mules, which are ſpirited creatures, and work themſelves by draught into a foaming heat, ſhould be put into a warm ſtable, until quite cool: for turning them looſe to paſture when ſo hot, is probably the cauſe of their deſtruction by the glanders.

If the care of providing ſhade for brute creatures is ſo much the duty and intereſt of their owners, how much more is it agreeable to the laws of humanity to provide ſhade for human creatures travelling upon the high roads in this hot climate? Nothing ſurely of ſo much beauty, coſts ſo little expence as planting cocoa-nut or ſpreading timber trees in avenues along the high-ways, if each proprietor of the lands adjoining hath any taſte of elegance, or feeling for other men: but both thoſe kinds of trees will yield alſo great profit to the proprietor, by furniſhing him with timber, when perhaps not otherwiſe to be had; or with a delicious milk, fitted by nature to cool the effervеſcence of the blood in this hot region; and alſo to improve the ſpirits made from ſugar to the delicacy and ſoftneſs of arrack. Cocoa-nut, and cabbage trees are both very beautiful and ſhady, bearing round heads of great expanſion, upon natural trunks, or pillars of elegant proportion, and of ſuch an height as to furniſh a large ſhade, with a free circulation of air equally refreſhing to man and beaſt.

The common objection of injury to canes by the roots of ſuch trees growing on their borders, may be eaſily removed by digging a ſmall trench between the canes and trees, which may intercept their roots, and oblige them to ſeek ſuſtenance in the common road. Let it alſo be conſidered, beſides the benefits above ſuggeſted, that the planter will thus beautify his eſtate to the reſemblance of a moſt ſumptuous garden. And probably that very beauty might not only render the iſlands more healthful to the inhabitants, by preſerving them from fevers kindled by the burning ſun-beams, but alſo much more fruitful by ſeaſonable weather: for as, by cutting down all its woods, an hot country becomes more ſubject to exceſſive droughts; ſo by replanting it in the manner above deſcribed, it would probably become more ſeaſonable.

Let then the planter be kind not only to his fellow-creatures, but merciful to his beaſts; giving them plenty and variety of wholeſome food, clear water, cool ſhade, and a clean bed, bleeding them after a long courſe of hard labour, currying their hides from filth and ticks (A); affording them ſalt, and other phyſic, when neceſſary; protecting them from the flaying rope-laſhes of a cruel driver (who needs no other inſtrument than a goad); proportioning their labour to their ſtrength; and by every art rendering their work as eaſy as poſſible. The general management of planters is not, perhaps, more defective in any other reſpect than in this: for, by pairing the cattle unequally, and by the drivers ill conduct in writhing to the right and left, the poor creatures are fatigued by needleſs labour. An horſe ought therefore to be harneſſed before them as a leader. This docile creature, by being led in a ſtraight line, will ſoon learn to be an unerring guide, and the cattle will follow in the ſame direction with united ſtrength, and conſequently with more effect and leſs fatigue to each individual.

The Portugueſe of Madeira, by their poverty and ſcantineſs of paſture, breed the ſmalleſt kind of cattle; and yet one yoke of them will draw a much greater weight than a pair of our largeſt oxen, ſolely by an equal exertion of their joint ſtrength. That equality or evenneſs of draught is preſerved by boring gimblet holes through their horns, within two inches of the points, and running a thong of leather through thoſe holes, ſo as to tie the horns of each pair at ſix inches diſtance from each other. By this ligature the pair of cattle are abſolutely hindered from turning different ways, and draw in an even direction with united force. Thus it appears evidently from reaſon, as well as from experience, that the labour of our beaſts may, by a little contrivance, be rendered more eaſy and effectual.

Of the Culture of various Soils.] In the Britiſh ſugar-colonies there is as great a variety of ſoils as in any country of Europe; ſome naturally very rich or fruitful, yielding a luxuriant product with little labour or culture. This fruitful ſoil is of three kinds: a looſe hazel mould mixed with ſand, like that of St Chriſtopher's, and is the beſt in the known world for producing ſugar in great quantity, and of the beſt quality. The brick mould of Jamaica is ſomewhat of the ſame nature, and next in value; and then the various mixtures of mould and gravel, to be found in veins or plats over all the other iſlands. When any of theſe ſoils are exhauſted of their fertility by long and injudicious culture, they may be reſtored by any kind of dung well rotted; for theſe (B) warm ſoils cannot bear hot unrotten dung, without being laid fallow for a conſiderable time after it. Another improvement is by ſea-ſand or ſea-weed; or by digging in the cane-traſh into ſteep lands, and by letting it lie to rot for ſome months. A third method is, by ploughing and laying it fallow; and the fourth method (the beſt of all), is by folding the fallows by ſheep. But this can be practiſed only where there are extenſive paſtures; nor can the plough be employed where the ſoil abounds with large ſtones. In that caſe, however, the former method of digging in traſh will be nearly as effectual, tho' more expenſive, by hand-labour, or hoe-ploughing.

The next beſt ſoil for producing good ſugar, is a mould upon clay, which if ſhallow, requires much culture and good labour, or its produce will be ſmall in quantity, though of a ſtrong grain and bright colour, ſo as to yield moſt profit to the refiner of any ſugar, except that produced from an hazel or gravelly ſoil, as before mentioned. All the black-mould ſoils upon marle are generally fruitful, and will take any kind of dung; but yield not ſo ſtrong or large-grained ſugar. Marle, however, of a white, yellow, or blue colour, or rich mould from waſhes, or aſhes of every kind, are excellent for every ſtrong ſoil, as the chief ingredient in the compoſt of dung: either of them will do alone for ſtiff lands; but the yellow and chocolate marle are the moſt ſoapy, and the richeſt kind of manure (except fine mould) for all ſtiff lands. If theſe are well opened, pulverized by culture, and mixed with hot dung, or any kind of looſe earth or marle, they will produce as plentifully as lighter ſoils: and all kinds of clay ſoils, except that of a white colour, have theſe two advantages above the fineſt gravel ſoils, that they do not ſcorch ſoon by dry weather, and never grow weary of the ſame manure, as moſt other ſoils do.

The extraordinary hand-labour beſtowed in making dung, may be ſaved by the art of caving, now in general uſe in England. Ten mules or horſes, and two light tumbrels with broad wheels, and ten able negroes, may, by the common uſe of ſpades, ſhovels, and light

---

(A) One pound of native ſulphur, a quart of lamp-oil, and the like quantity of hog's-lard, intimately mixed and made into an ointment, is a cure for the mange, lice, &c.

(B) Theſe ſoils which are naturally looſe and upon marle, Mr Martin calls *hot ſoils;* and theſe, he ſays, have been much injured in ſome of the iſlands by dung haſtily made with marle: but if the ſediment of lees were thrown into theſe pens, after being turned over, it would much improve the dung.

light mattocks, or grubbing-hoes, make more dung than 60 able negroes can do in the preſent methods.

If marle lies upon riſing ground, or in hillocks, as it often does, the pit is to be opened at the foot of the declivity; which being dug inwards, till the bank is three feet high, then it is to be *caved* thus. Dig an hollow ſpace of 12 or 18 inches deep under the foot of the bank; then dig into each ſide of it, another perpendicular cut of the ſame depth, and 18 inches wide, from the top of the bank to the bottom: that being finiſhed, make a ſmall trench a foot or two from the brink of the bank; pour into it water till full; and when that is done, fill it again, till the water ſoaking downward makes the marle ſeparate and fall down all at once. This may be repeated till the pit riſes to 50 feet high; and then many hundreds of cart-loads of marle may be thrown down by four negroes in two hours; from whence it may be carted into cattle-pens, or laid out upon lands, as occaſion requires. Five or ſix negroes with ſpades or ſhovels will keep two or three tumbrels employed, according to the diſtance of cartage: and thus as much dung may be made by ten negro men, as will dung richly at leaſt 70 or 80 acres of land every year, and laid out alſo with the aſſiſtance of cattle-carts: An improvement highly worth every planter's conſideration, when negroes, and feeding them are ſo expenſive; and this is no ſpeculation, but has been confirmed by practice. In level lands, the ſame operation may be as effectual, provided the mouth of the pit be opened by gradual deſcent to any depth: but when marle is to be found on the ſide of hills, the operation is leſs laborious for the horſes. But if the ſurface of the marle-pits (as it often happens) be covered with clay, or ſtiff ſoil, ſo that the water cannot quickly ſoak from the trench above; in that caſe, pieces of hard wood, made like piles, four feet long, and four inches ſquare, pointed at one end, and ſecured at the other ſquare head, by an iron clamp, may be driven by heavy mauls into the trench, as ſo many wedges, which will make the caved part tumble down: but a ſkilful eye muſt watch the laſt operation, or the labourers may be buried or hurt.

But then clay-ſoils that are level, and ſubject to be drowned, or to retain water in ſtagnated pools, can never be made fruitful by any kind of manure, without being firſt well drained: for water lying upon any ſoil will moſt certainly transform it to a ſtiff unfruitful clay; as appears evidently by the bogs of Ireland, the fens of Lincoln and Cambridgeſhire, and even by the ponds of Barbadoes ſituated in the deepeſt and lighteſt black mould; for that fine ſoil being waſhed into thoſe ponds, becomes the ſtiffeſt black clay, not fit even for an ingredient in dung, until it has been laid dry, and expoſed to the ſun for a whole year: but when theſe bogs and fens are well drained, they become the moſt fruitful ſoils. Natural clay the celebrated Boerhaave thinks the fatteſt of all ſoils; but then it muſt be opened by culture, marle, or ſandy manures. It is hard to conjecture how the opinion prevailed in the Britiſh plantations, that ſandy gut-mould was moſt unfit for clay-ſoils, as being the means of binding them to the compactneſs of brick; whereas it is proved, from long experience, to be one of the beſt means of opening clay-ſoils, and rendering them abundantly fruitful. Brick is made of *clay alone;* no ſand being uſed in it, farther than to ſprinkle the board on which it is moulded into ſhape. From repeated experience, it appears, that a mixture of ſand in gut-mold is the beſt of all manure for ſtiff and barren clay-lands; provided they be well drained, by throwing the whole ſoil into round ridges of 12 feet wide, with furrows of three feet wide between each ridge. And this is done with little more hand-labour than that of hoe-ploughing well in the common way. For if a piece of land be marked in lines at ſeven feet and a half diſtance from each other, and the labourers are ſet in to hoe-plough at the ſecond line, halling back each clod 12 inches; half the ridge, and near half the furrow, is made at the ſame time: and thus a piece of land may be round-ridged, and the furrows all made at once, by the common operation of hoe-ploughing, provided the digger drives his hoe up to the eye at every ſtroke. Hoe-ploughing in clay-ſoils that have lain long under water, is indeed hard labour; but it will every year grow the lighter by being well drained by round-ridging: and in the mean while the labour may be rendered much more eaſy by the plough conducted by the lines above deſcribed. As therefore ſandy mould is the beſt manure for ſtiff clay; ſo by parity of reaſon, confirmed by long experience, ſtiff clay is the beſt manure for ſandy or chaffy ſoils.

The method of round-ridging before deſcribed, is, by ſeveral years experience, found the moſt eſſential improvement of flat clayey ſoils: and yet there are ſome who will prefer ſpeculation to ocular demonſtration, fancying that all kinds of ridges will carry off the mould in heavy rains. The fact is otherwiſe in clay-ſoils: and plain reaſon, without experience, vouches, that where great confluxes of water are divided into many ſmall rills, the force is broken; and therefore leſs mould carried off the land. Another objection made to round-ridging, is, that by digging much clay to form the ſides of the ridge, the ſoil is impoveriſhed: but this objection ſtands good only againſt thoſe ridges which are raiſed too high, and made too broad; but if land is ridged in the manner before directed, that is, 12 feet broad, and not above ſix or eight inches higher in the middle than at the ſides, the objection vaniſhes. Ridges were never propoſed for light ſoils or ſteep lands; and even in flat ſoils upon loam they ſhould be made with great caution, becauſe *loam melts away by water.* But there are poachy lands of a white clay, even upon ſmall deſcents, too retentive of water; theſe may certainly be improved much by ridges of 12 feet wide, as above deſcribed, without fear of waſhes.

But ſuppoſing, as the objection urges, that a little clay ſhould be turned up at the ſides of ſuch ridges; can it not be manured ſomewhat more than the other parts, with marle, or ſandy mould, ſo as to become equally good with any other part of the ſoil? And is not this well worth the labour, ſince round-ridging not only improves the ſoil by draining it to a ſurpriſing degree, but adds one fifth part to the depth of the ſtaple? And will not a ridge made a little rounding, throw off the water much better than a flat ridge?

The general maxim of not burning cane-traſh (which may be called the *ſtubble of cane-lands*) upon any kind of ſoil, is ſurely a great miſtake; as may be evinced by obſerving the contrary practice of the beſt huſbandmen in England, where burn-baiting or baſtard burn-baiting, is found by experience an admirable method of fertilizing cold, ſtiff, or clayey lands. It muſt indeed be a conſtant practice, not only for the ſake of contributing to warm and divide the ſoil, but as the only effectual means of deſtroying pernicious inſects, and weeds of various kinds, ſuch as French weed, wild peaſe, and wild vines.

Soon after the diſuſe of burning traſh upon our lands in this iſland, the blaſt made its firſt appearance with incredible devaſtation: to revive that practice therefore ſeems to be the moſt obvious means of expelling it. It may be preſumed that the diſuſe of burning traſh was founded upon the miſtaken notion of burn-baiting, which is turning up a thick ſod of very dry, light, and ſhallow ſoils, and burning the whole ſuperficies, or ſtaple, to aſhes. This practice the writers upon huſbandry condemn univerſally, and very juſtly: for though by this practice the land will produce two or three crops more plentifully than ever, yet the ſoil is blown away by the wind, and the ſubſtratum being generally an hungry gravel, or chalk, can never be reſtored to fertility by the common arts of huſbandry. But ſurely this has no reſemblance to our ſuperficial burning of the little traſh we can ſpare from dung: and though this method of burn-baiting light and ſhallow ſoils be juſtly condemned, yet the beſt writers recommend that very practice, in cold, moiſt, and heavy ſoils, as is obſerved above; and long experience juſtifies it.

Deep mould upon clay or loam, being ſubject to the grub-worm (c), will not take any kind of dung, till perfectly rotten, except that of the ſheep-fold; which is the beſt manure for all kinds of light ſoils, and is of all others the leaſt expenſive, as not requiring hand-labour. But the uſe of the fold is impracticable in any iſland not abounding with large ſavannas, or ſheep-paſtures, as in Jamaica.

Thoſe ſoils therefore which are ſubject to the grub, and muſt be fertilized by common dung, which is a proper neſt for the mother-beetle to depoſit its eggs, muſt be well impregnated with the brine of diſſolved ſalt, after the dung is firſt cut up; two large hogsheads of ſalt will make brine enough for a dung-pen of 50 feet ſquare.

This cure for the grub is a late diſcovery; and which has been attended with ſucceſs, ſo far as the experiment is made. But though it proves effectual to deſtroy that pernicious inſect in plant-canes, it probably will not be ſufficient to ſave rattoons, without a new application of ſalt in powder; becauſe the firſt brine muſt be waſhed away, by the time when rattoons ſpring up.

The planter who would ſave his rattoons from the grub, ought therefore to cut off the heads of his ſtools with ſharp hoes three inches below the ſurface of the ſoil, and then ſtrew an handful of ſalt round each ſtool, and cover it up to a level with fine mold taken from the edges.

In ſoils where there is no grub, and the planter wiſhes to have very good rattoons, let him, as ſoon as his canes are cut, draw all the traſh from the ſtools into the alternate ſpaces, if planted in that manner; or into the furrows, if his land be round-ridged; and then cut off the head of his ſtools with ſharp hoes, as above directed. Experience has ſhown the advantage of this practice, and reaſon demonſtrates the great benefit of the rattoon-ſprouts riſing from three inches below the ſurface, inſtead of ſuperficial ſhoots which came to nothing, and only ſtarve the ſtrong ſprouts. Beſides, the ſtubbs which are left upon the ſtools after the canes are cut, canker, and rot the ſtools; which is one reaſon why good rattoons are uncommon in ſoils long cultivated. Yet it is the opinion of ſome, that by hoe-ploughing and even dunging rattoons, the produce might be as good as plant-canes, which would ſave the labour of holing and planting ſo often as planters commonly do.

Fallowing is of incredible advantage to every ſoil, not only by being divided into the minuteſt parts, but alſo by imbibing thoſe vegetative powers, with which the air is impregnated by the bountiful hand of Providence, whenever rain falls. What thoſe powers are, has been explained under the articles Agriculture and Plant; and experience evinces, that the tender vegetables of the earth are envigorated more by the ſmalleſt ſhower of rain, than by all the water which human art can beſtow. Let it therefore be a conſtant maxim of the planter, never to plant his ground until the ſoil is well mellowed by fallowing, even though he beſtows upon it a due proportion of dung: we ſay a due proportion; for too much will force up rank canes, which never yield good ſugar; and though ſome advantage may be reaped from the rattoons, yet it will be found by experience not to compenſate the loſs by the plants. In ſtony or ſteep ſoils, where the plough cannot be uſed, or where a ſufficient ſtrength of cattle cannot be ſupported for that purpoſe, hand-labour or hoe-ploughing muſt be ſubſtituted: but even in that caſe, much labour may be ſaved by ſpreading the dung according to the Engliſh huſbandry, and digging it into the ſoil. To evince this truth, let any planter compute his negroes labour of diſtributing dung by baſkets, and by ſpreading it with dung-forks; and then judge for himſelf by one ſingle experiment, which is the moſt profitable.

But if ſome planters are ſo devoted to the old cuſtom of diſtributing dung by baſkets, inſtead of wheel-barrows in level ground, or hand-barrows in uneven land, by which three times the labour may be accompliſhed in the ſame time and by the ſame hands; let them at leaſt ſave much of their hand-labour, by the following method of laying out dung, before the diſtribution by baſkets.

In holing a piece of land, let a ſpace be left after 80 holes from the firſt interval, and then the like ſpace after 80 holes throughout the whole plat, which ſpaces muſt run exactly parallel to the intervals on the right and left of the holes. Into theſe ſpaces the dung may be carted, even before it be rotten (d), at the moſt leiſure times, and covered with mould, or cane-traſh, to prevent exhalation; and in ſuch quantity as will ſuffice only to dung a row of 40 holes, from the point oppoſite to each ſide of it. In the intervals at each ſide of the cane-piece, which are parallel to thoſe ſpaces, there muſt be dung enough carted to manure a row of 40 holes, and covered in like manner.

(c) This pernicious inſect is moſt apt to engender in dung made from mill-traſh, which therefore never ought to be put into dung-compoſt, or ſtill-ponds; but after being burnt, the aſhes will be as good as any other kind. Round-ridging, with manure of unwet aſhes, ſea-ſand, or lime, or dry marle, kills the grub.

(d) In order to make dung rot the ſooner, much labour is beſtowed in digging and turning it over by hoes: but two-

By thus placing the dung or gut-mould, it is evident at the firſt ſight, that the fartheſt diſtance cannot be above 40 holes in diſtributing the dung: and in caſe it be not ſufficiently rotten for preſent uſe, it may be diſtributed even in dry weather, and covered by the bank; which will both prevent its ſpirit from exhalation, and occaſion it to rot ſooner, which is no ſmall advantage. Moreover, by being thus laid out at the moſt leiſure times, and covered with the banks, the dung will be more intimately mixed with the ſoil, and therefore continue to nouriſh the plant for a longer time than if laid as uſual at the bottom of the holes. A farther advantage of thus diſtributing the dung, and covering it, reſults from the more expeditious planting the land, after a ſhort or ſudden ſhower: for the labour of covering the dung, and uncovering it when the land is planted, however it may appear in ſpeculation, is in practice a trifle; and beſides all the other advantages ariſing by the diſtribution of dung from the ſpaces above deſcribed, this is not the leaſt, that not a bank is trodden under foot. But it is evident, that by diſtributing the dung with baſkets in the preſent method, the ſoil is much trampled under foot; and by that means, the very end of hoe-ploughing, or looſening the ſoil, is much defeated. In like manner, by the preſent method of hoe-ploughing, the ſame ill effect is produced; for as the negroes hoe-plough or dig the ſoil directly forward, ſo they muſt neceſſarily tread the ground as faſt as they dig it: whereas, by putting the labourers to dig ſidewiſe, no one puts a foot upon the ſoil after it is dug; and by lining the land before it is hoe-ploughed, each negroe may have an equal ſhare to dig. The only difficulty of hoe-ploughing ſidewiſe is in firſt ſetting the negroes to that work; but may be done without loſs of time when working in a contiguous field. Whether hoe-ploughing before or after the land be holed for canes, is moſt eligible, experience muſt determine; but certainly both operations will be moſt effectual: and therefore it will be adviſeable (E), firſt to plough the ſoil where the land will admit the plough; and where it will not, to hoe-plough it with, or without dung, as requiſite; then let it lie fallow till perfectly mellowed; then hole and plant it; and inſtead of weeding in the uſual manner, let the weeds in all the ſpaces be dug into the ſoil: but as this is not to be done ſo well with the hoe, it is ſubmitted to future experience, whether the dexterous uſe of ſpades, as in England, will not anſwer the purpoſe much better, and with equal diſpatch. But whatever method is preferred, moſt certain it is, that by looſening the ſoil in all the ſpaces between the young canes after being come up, their fibres will more eaſily expand on every ſide, and acquire more nutrition to envigorate their growth. But where the planter grudges this labour, by thinking it needleſs in a rich looſe ſoil, he may diſpatch more weeding-work by the Dutch hoe, than by any other; which being faſtened upon the end of a ſtick, is puſhed forward under the roots of the ſmall weeds, in ſuch a manner as to cut them up a little below the ſurface of the ſoil, and will do more execution at one ſhove than can be done at three ſtrokes of the common hoe: but there is yet another practice of the horſe-hoe plough, whereby all weeds growing in rows between beans and peaſe, are extirpated with incredible eaſe and expedition. It is a very ſimple machine, drawn by one or two horſes, conſiſting of a pair of low wheels turning upon a common axis; from whence two ſquare irons are let down at equal diſtances, and triangular hoes made at the ends, the points of the triangles being placed forward, and ſo fixed as to cut all weeds an inch below the ſurface, in the ſame manner as the Dutch garden-hoe abovementioned. By this machine a man and a boy, with two horſes or mules, will clear perfectly all the ſpaces of a field of ten acres in two days, and may be of admirable uſe in all looſe and dry ſoils in the ſugar-iſlands: for while two horſes or mules draw in the ſpace before each other, the wheels paſs on the outſide of each row of canes, without doing the leaſt injury, while the plough-holder attends to his buſineſs. In ſtiff ſoils which require draining, neither the horſe-hoe plough nor the Dutch hoe can be proper; or any other inſtrument ſo effectual as the ſpade uſed in the manner above hinted, where the ſtaple is deep.

But where the ſtaple of land is ſhallow, care muſt be taken not to dig much below it, according to the univerſal opinion of all the beſt writers, ſupported by the experience of 100 years. Yet ſome good planters are fallen into the contrary practice, and dig up ſtiff clay far below the ſtaple. This, Mr Martin ſays, was done in his own lands, during his abſence, by injudiciouſly ploughing below the ſtaple; and ſo injured the ſoil, that all the arts of culture for many years hardly retrieved its former fertility. Indeed where the ſtaple is ſhallow, upon a fat clay, there turning up a little of it at a time, from the bottom of the cane-holes, and mixing it with rich hot dung, made of marle, or ſandy mold, which may take off its coheſive quality, will in due time, and by long fallow, be converted into good ſoil: but if ſtiff clay be turned up, without any ſuch mixture, in large quantities, it will infallibly diſappoint the operator's hopes: for though ſolid clay will moulder, by expoſure, to a ſeeming fine earth, yet it will return to its primitive ſtate, very ſoon after being wet, and covered from the external air, if not divided, as above ſuggeſted.

After all, the common horſe-hoeing plough drawn by two mules in a line before each other, or the hand-hoe in common uſe, will anſwer the purpoſe

---

two-thirds of that labour may be ſaved by the uſe of hay-knives, ſix of which, uſed dexterouſly, will cut up a pen in leſs time than 60 negroes can do by hoes: but hay-knives cannot be uſed where gritty mould is uſed in pens.

(E) Deep and looſe ſoils may be ploughed with a ſmall ſtrength of cattle or mules: but ſtiff lands in hot climates require more ſtrength of cattle than can be maintained in the ſmall paſtures of the planters; for if thoſe ſtrong ſoils are either too wet or too dry (as is generally the caſe), ploughing is impracticable.

very well, where the lands are planted in Mr Tull's method; that is, where the ſpaces are equal to the land planted, in the following manner.

Suppoſe ſix feet planted in two rows of canes, and ſix feet of land left as a ſpace unplanted; and ſo a whole piece of land, planted in alternate double rows (F), with equal ſpaces, may be hoe-ploughed with eaſe, as before hinted; and that at any time during the growth of canes, when it is moſt convenient to the planter, which is a conſiderable advantage; and yet it is the leaſt of all attending this method of culture: for, by leaving theſe ſpaces, the canes will have both more air and ſun: by hoe-ploughing them, the roots of each double row will have large room for expanſion, and conſequently, by gaining more nutriment, will grow more luxuriantly: by theſe ſpaces the canes may be cleaned from the blaſt with much more eaſe and convenience; and will ſerve as proper beds to plant great corn, without the leaſt injury to the canes; as well as to contain the traſh taken off the land, where, by rotting, and being hoe-ploughed into the ſoil, it will be wonderfully enriched, and well fitted to be planted immediately after the canes in the neighbouring double rows are cut down. Beſides all theſe admirable advantages of planting the land in alternate double rows with equal ſpaces, the canes, when at full age, may be eaſily ſtripped of their traſh, and by that means the juice rendered ſo mature as to yield double the produce, and much better ſugars than unſtripped canes. This method of culture may be recommended for all kinds of ſoil: for as by this practice the rank luxuriant canes will be more matured, ſo the poor ſoils will be rendered more fruitful; and as the roots of the canes which expand into theſe ſpaces, will be kept moiſt by being covered with rotten traſh, ſo they muſt bear dry weather much longer in the burning ſoils. In thoſe low lands which require draining by furrows, the alternate double rows and ſpaces muſt be made croſs the ridges; by which means, thoſe ſpaces, being hoe-ploughed from the centre to the ſides, will be always preſerved in a proper ſtate of roundneſs. By this method of planting, the canes may be ſo well ripened as to yield double the quantity of ſugar, of canes planted in the cloſe manner; which ſaves half the labour of cartage, half the time of grinding and boiling, and half the fuel, beſides yielding finer ſugar.

Yet, how well ſoever the method of planting in ſingle or double alternate rows has ſucceeded in the looſe and ſtiff ſoils, experience has ſhown that it is a wrong practice in ſtiff lands that are thrown into round or flat ridges: for theſe being moſt apt to crack, the ſun-beams penetrate ſoon to the cane-roots, ſtop their growth, and have an ill influence upon the ſugar. It is therefore adviſeable to plant ſuch lands full, but in large holes, of 4 feet, by 5 feet towards the banks: after the plant-canes are cut, to dig out one, and leave two rows ſtanding, hoe-ploughing the ſpaces after turning all the traſh into furrows till almoſt rotten: for if the traſh is drawn upon the hoe-ploughed ſpaces, they will hardly ever moulder; at leaſt not till the traſh is quite rotten. This is an infallible proof from experience, of how little advantage traſh is to the ſoil, unleſs it be in great droughts, to keep out the intenſe ſun-beams: for, in all other reſpects, it prevents that joint operation of the ſun and air in mouldering and fructifying the ſoil, as has been proved by repeated experiments.

But in flat ſtiff ſoils that are properly drained by round-ridging, no culture prevents cracking ſo effectually as hoe-ploughing into them a quantity of looſe marl, of which that of a chocolate or of a yellow colour is beſt; and will be ſtill much better, by lying upon the land, in ſmall heaps, or in cane-holes, for ſome time, to imbibe the vegetative powers of the air, before it is intimately mixed with the ſoil.

As to the manner of planting canes, the general practice of allowing four feet by five to an hole, and two freſh (G) plants, is found by common experience to be right and good in alternate rows. But the following precautions are neceſſary to be obſerved. Firſt, let all the cane-rows run eaſt and weſt, that the trade-wind may paſs freely through them; becauſe air and ſunſhine are as conducive to the growth and maturation of ſugar-canes, as any other vegetable. Secondly, let not any acceſſion of mould be drawn into hills round the young canes, except where water ſtagnates (H); becauſe the fibres which run horizontally, and near the ſurface, are much broken and ſpoiled by that practice. Thirdly, let the ſugar-canes be cut at their full maturity; which, in a dry looſe ſoils, is generally at the end of 14 or 15 months after being planted; but in cold clay-ſoils, not till 16 or 17 months. Fourthly, as the cane-rows run eaſt and weſt in as proper a direction as poſſible for cartage to the ſugar-work, ſo canes muſt be cut the contrary way if the planter expects any great produce from his rattoons: for by beginning to cut canes at the part of his field moſt remote from the works, the carts cannot often paſs over the ſame tract, and conſequently the cane-ſtools cannot be injured, more eſpecially if he takes due care to cut the canes very cloſe to their roots; for, by leaving a long ſtub, (which muſt periſh) the cane-ſtools are much injured. It may be objected to the practice of the cuttings cane tranſverſely to the rows, that the negroes labour will not be ſo equally divided: but let every man conſider both ſides of the queſtion, and be determined by his own experience; and then he will be convinced, that it matters very little which way he cuts ſtraight ſtanding canes; but in caſes where the ſugar-canes lean, or are lodged by preceding high winds, it is a point of great importance to place the labourers ſo as to cut the canes firſt at the roots, and then, drawing them, cut off the tops: for thus by two ſtrokes each cane will be

---

(F) In ſtiff lands, the ſingle alternate rows of four feet diſtance, as preventive of much labour in weeding, are found beſt; and alſo yield more ſugar by the acre; and are leſs apt to be affected by drought.

(G) It is an odd fancy that ſtale plants grew beſt, when both reaſon and experience vouch that the moſt ſucculent plants are beſt: one good plant in the centre of a large hole is ſufficient when the land is full holed.

(H) The ſtagnation of water in pools (uſual in ſtiff level lands) is the moſt injurious circumſtance attending it; for that, by long duration, will convert the fineſt mould to ſtiff clay. The proprietor of ſuch a ſoil muſt therefore grudge no labour to drain it well; and yet by ſuch eaſy gradation, as to prevent the mould from being waſhed away by great floods, in caſe the under ſtratum is a loam.

be cut; and twice the quantity cut in the ſame time, and by the ſame hands, more than by cutting in any other direction. In round-ridged land, it is proper to cut canes in the ſame direction of the ridges, throwing the tops and traſh into the furrows to render the cartage eaſy, and to preſerve the ridges in their proper form.

It is almoſt needleſs to ſuggeſt the expediency of planning the cane-pieces of a plantation in exact ſquares, ſo that the intervals may interſect at right angles; ſince ſuch regularity is not only more beautiful, more ſafe in caſe of accidental fires, and a better diſpoſition of the whole for dividing and planting one third or fourth part of a plantation every year, but alſo much eaſier guarded by a few watchmen: for one of theſe walking in a line from eaſt to weſt, and the other from north to ſouth, look through every avenue, where the moſt ſubtile thief cannot eſcape the watchful eye. And if the intervals ſurrounding the boundary of a regular plantation be made 24 feet wide, the proprietor will receive ample recompenſe for ſo much land, by the ſecurity of his canes from fires kindled in the neighbourhood, and by planting all that land in plantain-trees, which may at once yield food and ſhade to the watchmen, who by that means can have no excuſe for abſence from their proper ſtations. But as fuel grows very ſcarce in moſt of our iſlands, it is alſo expedient to plant a logwood or flower-fence in all the boundaries of every plantation, which, being cut every year, will furniſh good ſtore of faggots. Logwood makes the ſtrongeſt and quickeſt of all fences, and agrees with every ſoil: the cuttings make excellent oven-fuel.

So much for the general operations of planterſhip, according to the approved directions of Mr Martin. For the particular cultivation of the ſugar-canes, the extraction of the ſugar, and the diſtillation of rum, ſee the articles SACCHARUM, SUGAR, and RUM.

PLANTIN (Chriſtopher), a celebrated printer, was born near Tours in 1533, and bred to an art which he carried to the higheſt degree of perfection. He went and ſettled at Antwerp; and there erected a printing-office, which was conſidered not only as the chief ornament of the town, but as one of the moſt extraordinary edifices in Europe. A great number of ancient authors were printed here; and theſe editions were valued not only for the beauty of the characters, but alſo for the correctneſs of the text, with regard to which Plantin was ſo very nice, that he procured the moſt learned men to be correctors of his preſs. He got immenſe riches by his profeſſion; which however he did not hoard up, but ſpent like a gentleman. He died in 1598, aged 65 years; and left a moſt ſumptuous and valuable library to his grandſon Balthaſar.

PLANTING, in agriculture and gardening, is ſetting a tree or plant, taken from its proper place, in a new hole or pit; throwing freſh earth over its root, and filling up the hole to the level of the ſurface of the ground.

The firſt thing in planting is to prepare the ground before the trees or plants are taken out of the earth, that they may remain out of the ground as ſhort a time as poſſible; and the next is, to take up the trees or plants, in order to their being tranſplanted. In taking up the trees, carefully dig away the earth round the roots, ſo as to come at their ſeveral parts to cut them off; for if they are torn out of the ground without care, the roots will be broken and bruiſed, to the great injury of the trees. When you have taken them up, the next thing is to prepare them for planting by pruning the roots and heads. And firſt, as to the roots; all the ſmall fibres are to be cut off, as near to the place from whence they are produced as may be, except they are to be replanted immediately after they are taken up. Then prune off all the bruiſed or broken roots, all ſuch as are irregular and croſs each other, and all downright roots, eſpecially in fruit-trees: ſhorten the larger roots in proportion to the age, the ſtrength, and nature of the tree; obſerving that the walnut, mulberry, and ſome other tender-rooted kinds, ſhould not be pruned ſo cloſe as the more hardy ſorts of fruit and foreſt trees: in young fruit-trees, ſuch as pears, apples, plumbs, peaches, &c. that are one year old from the time of their budding or grafting, the roots may be left only about eight or nine inches long; but in older trees, they muſt be left of a much greater length: but this is only to be underſtood of the larger roots; for the ſmall ones muſt be chiefly cut quite out, or pruned very ſhort. The next thing is the pruning of their heads, which muſt be differently performed in different trees; and the deſign of the trees muſt alſo be conſidered. Thus, if they are deſigned for walls or eſpaliers, it is beſt to plant them with the greateſt part of their heads, which ſhould remain on till they begin to ſhoot in the ſpring, when they muſt be cut down to five or ſix eyes, at the ſame time taking care not to diſturb the roots. But if the trees are deſigned for ſtandards, you ſhould prune off all the ſmall branches cloſe to the place where they are produced, as alſo the irregular ones which croſs each other; and after having diſplaced theſe branches, you ſhould alſo cut off all ſuch parts of branches as have by any accident been broken or wounded; but by no means cut off the main leading ſhoots which are neceſſary to attract the ſap from the root, and thereby promote the growth of the tree. Having thus prepared the trees for planting, you muſt now proceed to place them in the earth: but firſt, if the trees have been long out of the ground, ſo that the fibres of the roots are dried, place them eight or ten hours in water, before they are planted, with their heads erect, and the roots only immerſed therein; which will ſwell the dried veſſels of the roots, and prepare them to imbibe nouriſhment from the earth. In planting them, great regard ſhould be had to the nature of the ſoil: for if that be cold and moiſt, the trees ſhould be planted very ſhallow; and if it be a hard rock or gravel, it will be better to raiſe a hill of earth where each tree is to be planted, than to dig into the rock or gravel, and fill it up with earth, as is too often practiſed, by which means the trees are planted as it were in a tub, and have but little room to extend their roots. The next thing to be obſerved is, to place the trees in the hole in ſuch a manner that the roots may be about the ſame depth in the ground as before they were taken up; then break the earth fine with a ſpade, and ſcatter it into the hole, ſo that it may fall in between every root, that there may be no hollowneſs in the earth: then having filled up the hole, gently tread down the earth with your feet, but do not make it too hard; which is a great fault, eſpecially if the ground be ſtrong or wet. Having thus planted the trees, they ſhould be faſtened to ſtakes driven into the ground to prevent their being diſplaced by the wind, and ſome mulch laid upon the ſurface of the ground about their roots; as to ſuch as are planted againſt walls, their roots ſhould be placed about five or ſix inches from the wall, to which their heads ſhould be nailed to prevent their being blown up by the wind. The ſeaſons for planting are various, according to the different ſorts of trees, or the ſoil in which they are planted. For the trees whoſe leaves fall off in winter, the beſt time is the beginning of October, provided the ſoil be dry; but if it be a very wet ſoil, it is better to defer it till the latter end of February, or the beginning of March: and for many kinds of evergreens, the beginning of April is by far the beſt ſeaſon; though they may be ſafely removed at Midſummer, provided they are not to be carried very far; but ſhould always make choice of a cloudy wet ſeaſon.

Reverſe PLANTING, a method of planting in which the natural poſition of the plant or ſhoot is inverted; the branches being ſet into the earth, and the root reared into the air. Dr Agricola mentions this monſtrous method of planting, which he found to ſucceed very well in moſt or all ſorts of fruit-trees, timber-trees, &c. Bradley affirms that he has ſeen a lime-tree in Holland growing with its firſt roots in the air, which had ſhot out branches in great plenty, at the ſame time that its firſt branches produced roots and fed the tree. Mr Fairchild, of Hoxton, has practiſed the ſame with us, and gives the following directions for performing it: Make choice of a young tree of one ſhoot, of alder, elm, willow, or any other tree that eaſily takes root by laying; bend the ſhoot gently down into the earth, and ſo let it remain till it has taken root. Then dig about the firſt root, and raiſe it gently out of the ground, till the ſtem be nearly upright, and ſtake it up. Then prune the roots, now erected in the air, from the bruiſes and wounds they received in being dug up; and anoint the pruned parts with a compoſition of two ounces of turpentine, four ounces of tallow, and four ounces of bees wax, melted together, and applied pretty warm. Afterwards prune off all the buds or ſhoots that are upon the ſtem, and dreſs the wounds with the ſame compoſition, to prevent any collateral ſhootings, that might ſpoil the beauty of the ſtem.

PLANUDES (Maximus), a Greek monk of Conſtantinople, towards the end of the 14th century, who publiſhed a collection of epigrams intitled *Anthologia*; a Greek tranſlation of Ovid's Metamorphoſes; a Life of Æſop, which is rather a romance than a hiſtory; and ſome other works. We know nothing more of him, than that he ſuffered ſome perſecution on account of his attachment to the Latin church.

PLASHING *of* QUICKSET-HEDGES, an operation very neceſſary to promote the growth and continuance of old hedges. See the article HEDGE.

It is performed in this manner: The old ſtubs muſt be cut off, &c. within two or three inches of the ground; and the beſt and longeſt of the middle-ſized ſhoots muſt be left to lay down. Some of the ſtrongeſt of theſe muſt alſo be left to anſwer the purpoſe of ſtakes. Theſe are to be cut off to the height at which the hedge is intended to be left; and they are to ſtand at ten feet diſtance one from another: when there are not proper ſhoots for theſe at the due diſtances, their places muſt be ſupplied with common ſtakes of dead wood. The hedge is to be firſt thinned, by cutting away all but thoſe ſhoots which are intended to be uſed either as ſtakes, or the other work of the plaſhing: the ditch is to be cleaned out with the ſpade; and it muſt be now dug as at firſt, with ſloping ſides each way; and when there is any cavity on the bank on which the hedge grows, or the earth has been waſhed away from the roots of the ſhrubs, it is to be made good by facing it, as they expreſs it, with the mould dug from the upper part of the ditch: all the reſt of the earth dug out of the ditch is to be laid upon the top of the bank: and the owner ſhould look carefully into it that this be done; for the workmen, to ſpare themſelves trouble, are apt to throw as much as they can upon the face of the bank; which being by this means overloaded, is ſoon waſhed off into the ditch again, and a very great part of the work undone; whereas what is laid on the top of the bank always remains there, and makes a good fence of an indifferent hedge.

In the plaſhing the quick, two extremes are to be avoided; theſe are, the laying it too low, and the laying it too thick. The latter makes the ſap run all into the ſhoots, and leaves the plaſhes without ſufficient nouriſhment; which, with the thickneſs of the hedge, finally kills them. The other extreme of laying them too high, is equally to be avoided; for this carries up all the nouriſhment into the plaſhes, and ſo makes the ſhoots ſmall and weak at the bottom, and conſequently the hedge thin. This is a common error in the north of England. The beſt hedges made any where in England, are thoſe in Hertfordſhire; for they are plaſhed in a middle way between the two extremes, and the cattle are by that prevented both from croping the young ſhoots, and from going through; and a new and vigorous hedge ſoon forms itſelf.

When the ſhoot is bent down that is intended to be plaſhed, it muſt be cut half way through with the bill: the cut muſt be given ſloping, ſomewhat downwards, and then it is to be wound about the ſtakes, and after this its ſuperfluous branches are to be cut off as they ſtand out at the ſides of the hedge. If for the firſt year or two, the field where a new hedge is made can be ploughed, it will thrive the better for it; but if the ſtubs are very old, it is beſt to cut them quite down, and to ſecure them with good dead hedges on both ſides, till the ſhoots are grown up from them ſtrong enough to plaſh; and wherever void ſpaces are ſeen, new ſets are to be planted to fill them up. A new hedge raiſed from ſets in the common way, generally requires plaſhing in about eight or nine years after.

PLASTER, in pharmacy, an external application of a harder conſiſtence than an ointment; to be ſpread, according to the different circumſtances of the wound, place, or patient, either upon linen or leather. See PHARMACY, n° 854, &c.

PLASTER, or PLAISTER, in building, a compoſition

tion of lime, ſometimes with ſand, &c. to parget, or cover the nudities of a building. See Pargetting and Stucco.

Plaster *of Paris*, a preparation of ſeveral ſpecies of gypſum dug near Mont Maitre, a village in the neighbourhood of Paris; whence the name. See Gypsum; and Chemistry, n° 127, 128.

The beſt ſort is hard, white, ſhining, and marbly; known by the name of *plaſter-ſtone* or *parget of Mount Maitre*. It will neither give fire with ſteel, nor ferment with aqua fortis; but very freely and readily calcines in the fire into a fine plaſter, the uſe of which in building and caſting ſtatues is well known.

The method of repreſenting a face truly in plaſter of Paris is this: The perſon whoſe figure is deſigned is laid on his back, with any convenient thing to keep off the hair. Into each noſtril is conveyed a conical piece of ſtiff paper, open at both ends, to allow of reſpiration. Theſe tubes being anointed with oil, are ſupported by the hand of an aſſiſtant; then the face is lightly oiled over, and the eyes being kept ſhut, alabaſter freſh calcined, and tempered to a thinniſh conſiſtence with water, is by ſpoonfuls nimbly thrown all over the face, till it lies near the thickneſs of an inch. This matter grows ſenſibly hot, and in about a quarter of an hour hardening into a kind of ſtony concretion; which being gently taken off, repreſents, on its concave ſurface, the minuteſt part of the original face. In this a head of good clay may be moulded, and therein the eyes are to be opened, and other neceſſary amendments made. This ſecond face being anointed with oil, a ſecond mould of calcined alabaſter is made, conſiſting of two parts joined lengthwiſe along the ridge of the noſe; and herein may be caſt, with the ſame matter, a face extremely like the original.

If finely powdered alabaſter, or plaſter of Paris, be put into a baſon over a fire, it will, when hot, aſſume the appearance of a fluid, by rolling in waves, yielding to the touch, ſteaming, &c. all which properties it again loſes on the departure of the heat; and being thrown upon paper, will not at all wet it, but immediately diſcover itſelf to be as motionleſs as before it was ſet over the fire; whereby it appears, that a heap of ſuch little bodies, as are neither ſpherical nor otherwiſe regularly ſhaped, nor ſmall enough to be below the diſcernment of the eye, may, without fuſion, be made fluid, barely by a ſufficiently ſtrong and various agitation of the particles which compoſe it; and moreover loſe its fluidity immediately upon the ceſſation thereof.

Two or three ſpoonfuls of burnt alabaſter, mixed up thin with water, in a ſhort time coagulate, at the bottom of a veſſel full of water, into a hard lump, notwithſtanding the water that ſurrounded it. Artificers obſerve, that the coagulating property of burnt alabaſter will be very much impaired or loſt, if the powder be kept too long, eſpecially if in the open air, before it is made uſe of; and when it hath been once tempered with water, and ſuffered to grow hard, they cannot, by any burning or powdering of it again, make it ſerviceable for their purpoſe as before.

This matter, when wrought into veſſels, &c. is ſtill of ſo looſe and ſpongy a texture, that the air has eaſy paſſage through it. Mr Boyle gives an account, among his experiments with the air-pump, of his preparing a tube of this plaſter, cloſed at one end and open at the other; and on applying the open end to the cement, as is uſually done with the receivers, it was found utterly impoſſible to exhauſt all the air out of it; for freſh air from without preſſed in as faſt as the other, or internal air, was exhauſted, though the ſides of the tube were of a conſiderable thickneſs. A tube of iron was then put on the engine; ſo that being filled with water, the tube of plaſter of Paris was covered with it; and on uſing the pump, it was immediately ſeen, that the water paſſed through into it as eaſily as the air had done, when that was the ambient fluid. After this, trying it with Venice turpentine inſtead of water, the thing ſucceeded very well; and the tube might be perfectly exhauſted, and would remain in that ſtate ſeveral hours. After this, on pouring ſome hot oil upon the turpentine, the caſe was much altered; for the turpentine melting with this, that became a thinner fluid, and in this ſtate capable of paſſing like water into the pores of the plaſter. On taking away the tube after this, it was remarkable that the turpentine, which had pervaded and filled its pores, rendered it tranſparent, in the manner that water gives tranſparency to that ſingular ſtone called *oculus mundi*. In this manner, the weight of air, under proper management, will be capable of making ſeveral ſorts of glues penetrate plaſter of Paris; and not only this, but baked earth, wood, and all other bodies, porous enough to admit water on this occaſion.

PLASTERING. See Pargetting.

PLASTIC, denotes a thing endowed with a formative power, or a faculty of forming or faſhioning a maſs of matter after the likeneſs of a living being; ſuch a virtue, as ſome of the ancient Epicureans, and perhaps the Peripatetics too, imagined to reſide in the earth, or at leaſt to have anciently reſided therein, by means whereof, and without any extraordinary intervention of a Creator, it put forth plants, &c. Some of them ſeem to have been of opinion that animals, and even man himſelf, were the effects of this plaſtic power.

Plastic *Art*, the art of repreſenting all ſorts of figures by the means of moulds. This term is derived from the Greek word πλαςικη, which ſignifies the "art of forming, modelling, or caſting in a mould." A mould, in general, is a body that is made hollow for that purpoſe. The artiſt makes uſe of them to form figures in bronze, lead, gold, ſilver, or any other metal, or fuſible ſubſtance. The mould is made of clay, ſtucco, or other compoſition, and is hollowed into the form of the figure that is to be produced; they then apply the jet, which is a ſort of funnel, through which the metal is poured that is to form the figures, and that is called *running the metal into the mould*.

It is in this manner, but with much practice and attention, that the artiſt forms, 1. Equeſtrian and pedeſtrian ſtatues of every kind; 2. Groups; 3. Pedeſtals; 4. Baſs reliefs; 5. Medallions; 6. Cannons, mortars, and other pieces of artillery; 7. Ornaments of architecture, as capitals, baſes, &c.; 8. Various ſorts of furniture, as luſtres, branches, &c. in every kind of metal: and in the ſame manner figures are caſt in ſtucco, plaſter, or any other fuſible matter.

Plaſtic.

Wax being a ſubſtance that is very eaſily put in fuſion, plaſtics makes much uſe of it. There are impreſſions which are highly pleaſing in coloured wax, of medallions, baſſo and alto relievos, and of detached figures; which however are ſomewhat brittle. But this matter has been carried too far: they have not only formed moulds to repreſent the likeneſs and the buſt of a living perſon, by applying the plaſter to the face itſelf, and afterward caſting melted wax into the mould; but they have alſo painted that waxen buſt with the natural colours of the face, and have then applied glaſs eyes and natural hair; to which they have joined a ſtuffed body and limbs, with hands of wax; and have, laſtly, dreſſed their figure in a real habit; and by theſe means have produced an object the moſt ſhocking and deteſtable that it is poſſible to conceive. It is not a ſtatue, a buſt, a natural reſemblance that they form; but a dead body, a lifeleſs countenance, a mere carcaſe. The ſtiff air, the inflexible muſcles, the haggard eyes of glaſs, all contribute to produce an object that is hideous and diſguſtful to every man of taſte. Figures like theſe offend by affording too exact an imitation of nature. In no one of the polite arts ought imitation ever to approach ſo near the truth as to be taken for nature herſelf. Illuſion muſt have its bounds; without which it becomes ridiculous.

There is another invention, far more ingenious and pleaſing, which is that wherein M. Lippart, antiquary and artiſt at Dreſden, now excels. He has found the means of reſembling, by indefatigable labour, great expence, and infinite taſte, that immenſe number of ſtones, engraved and in camaieu, which are to be ſeen in the moſt celebrated cabinets. He has made choice of thoſe that are the moſt beautiful; and, with a paſte of his own invention, he takes from theſe ſtones an impreſſion that is ſurpriſingly accurate, and which afterward become as hard as marble: theſe impreſſions he calls *paſti*. He then gives them a proper colour, and incloſes each with a gold rim; and, by ranging them in a judicious order, forms of them an admirable ſyſtem. They are fixed on paſteboards, which form ſo many drawers, and are then incloſed in caſes, which repreſent folio volumes, and have titles wrote on their backs; ſo that theſe fictitious books may conveniently occupy a place in a library. Nothing can be more ingenious than this invention; and, by this method, perſons of moderate fortune are enabled to make a complete collection of all antiquity has left that is excellent of this kind; and theſe copies are very little inferior to the originals.

There is alſo another method of taking the impreſſions of camaieus, medals, and coins, which is as follows: They waſh or properly clean the piece whoſe impreſſion is to be taken, and ſurround it with a border of wax. They then diſſolve iſinglaſs in water, and make a decoction of it, mixing with it ſome vermilion to give it an agreeable red colour. They pour this paſte, when hot, on the ſtone or medal, to the thickneſs of about the tenth part of an inch; they then leave it expoſed to the ſun, in a place free from duſt. After a few days this paſte becomes hard, and offers to the eye the moſt admirable and faithful repreſentation of the medal that it is poſſible to conceive: they are then carefully placed in drawers; and thouſands of theſe impreſſions, which comprehend many ages, may be included in a ſmall compaſs.

The proficients in plaſtics have likewiſe invented the art of caſting, in a mould, papier maché or diſſolved paper, and forming it into figures in imitation of ſculpture, of ornaments and decorations for ceilings, furniture, &c. and which they afterwards paint or gild. There are, however, ſome inconveniencies attending this art; as, for example, the imperfections in the moulds, which render the contours of the figures inelegant, and give them a heavy air: theſe ornaments, moreover, are not ſo durable as thoſe of bronze or wood, ſeeing that in a few years they are preyed on by the worm.

The figures that are given to porcelain, delpht ware, &c. belong alſo to plaſtics; for they are formed by moulds, as well as by the art of the ſculptor and turner; and by all theſe arts united, are made vaſes of every kind, figures, groups, and other deſigns, either for uſe or ornament.

From this general article the reader is referred to FOUNDERY, CASTING, GLASS, CHINA *Ware*, PAPIER-*Mache*, POTTERY.

Plata.

PLATA, the name of a very great river of South America, running through the province of Paraguay; whence the whole country is ſometimes called *Plata;* though this name is uſually beſtowed only upon a part of Paraguay. In the latter ſenſe it comprehends all that country bounded on the eaſt and ſouth-eaſt by the Atlantic Ocean; on the ſouth, by Terra Magellanica; on the weſt, by Tucuman; and on the north, by the provinces of Paraguay Proper, and Parana. The great river La Plata, from which the country has its name, was firſt diſcovered, in 1515, by Juan Diaz de Solis; but denominated *La Plata* by Sebaſtian Gabato, from the great quantity of the precious metals he procured from the adjacent inhabitants, imagining it was the produce of the country, though in fact they brought it from Peru.

The country lies between 32° and 37° of ſouth latitude. The climate is pleaſant and healthy. Their winter is in May, June, and July, when the nights are indeed very cold, but the days moderately warm; the froſt is neither violent nor laſting, and the ſnows are very inconſiderable.

The country conſiſts moſtly of plains of a vaſt extent, and exceeding rich ſoil, producing all ſorts of European and American fruits, wheat, maiz, cotton, ſugar, honey, &c. and abounding with ſuch excellent paſtures, that the beaſts brought hither from Spain are multiplied to ſuch a degree, that they are all in common, no man claiming any property in them, but every man takes what he hath occaſion for. The number of black cattle, eſpecially, is ſo prodigious, that many thouſands of them are killed merely for their hides, every time the ſhips go for Spain, and their carcaſes left to be devoured by wild beaſts and birds of prey, which are alſo very numerous. Sometimes, when they cannot vend their hides, they will kill them for their tongues; and thoſe who care not to be at the trouble to fetch them from the plains, may buy them for a trifle. There is a curious account in Lord Anſon's voyage of the manner of hunting them on horſeback; and of catching and killing them, by throwing a nooſe on their horns at full gallop, the horſes being trained to the ſport. Horſes are no leſs numerous, and in common, like the other cattle; ſo that a man may have as many as he pleaſes for the catching; and of thoſe that are already broke, one may buy ſome of the beſt, and of the true Spaniſh breed, for a piece-of-eight per head. Wild-fowl alſo is in great plenty here; partridges, in particular, are more numerous, and as large and tame as our hens, ſo that one may kill them with a ſtick. Their wheat makes the fineſt and whiteſt of bread; and, in a word, they ſeem to want for nothing here, eſpecially the natives, but ſalt and fuel. The former the Spaniards have brought to them from other parts; and the latter they ſupply themſelves with, by planting vaſt numbers of almond, peach, and other trees, which require no other trouble than putting the kernels into the ground, and by the next year, we are told, they begin to bear fruit. The return for European commodities is ſo great here, that it almoſt exceeds belief; an ordinary two-penny knife fetching a crown; and a gun of the value of 10 or 12 ſhillings, 20 or 30 crowns, and ſo of the reſt.

The river Plata riſes in Peru, and receives a great many others in its courſe, the chief of which is the Paraguay. The water of it is ſaid to be very clear and ſweet, and to petrify wood; and contains ſuch plenty and variety of fiſh, that the people catch great quantities of them without any other inſtrument than their hands. It runs moſtly to the ſouth and ſouth-eaſt; and is navigable the greater part of its courſe by the largeſt veſſels, and full of delightful iſlands. All along its banks are ſeen the moſt beautiful birds of all kinds; but it ſometimes overflows the adjacent country to a great extent, and is infeſted by ſerpents of a prodigious bigneſs. From its junction with the Paraguay to its mouth is above 200 leagues. We may form ſome judgment of its largeneſs by the width of its mouth, which is ſaid to be about 70 leagues. Before it falls into the Paraguay, it is called *Panama*.

PLATÆÆ, (anc. geog.), a very ſtrong town of Bœotia, in its ſituation expoſed to the north wind, (Theophraſtus); burnt to the ground by Xerxes, (Herodotus, Juſtinus); mentioned much in the courſe of the Perſian war: Famous for the defeat of Mardonius, the Perſian general; and for the moſt ſignal victory of the Lacedæmonians and other Greeks under Pauſanias the Lacedæmonian, and Ariſtides an Athenian general, (Nepos, Diodorus, Plutarch); in memory of which the Greeks erected a temple to Jupiter Eleutherius, and inſtituted games which they called *Eleutheria*; and there they ſhow the tombs of thoſe who fell in that battle, (Strabo). It ſtood at the foot of mount Cithæron, between that and Thebes to the north, on the road to Athens and Megara, and on the confines of Attica and Megaris. Now in ruins.

PLATALEA, the SPOONBILL, in ornithology, a genus belonging to the order of grallæ. The beak is plain, and dilates towards the point into an orbicular form; the feet have three toes, and are half palmated. There are three ſpecies, diſtinguiſhed by their colour. They inhabit the continent of Europe. See Plate CCXLIV. fig 3.

PLATANUS, the PLANE-TREE; a genus of the polyandria order, belonging to the monœcia claſs of plants.

Species. 1. The orientalis, oriental or eaſtern plane-tree, riſes with a very ſtraight ſmooth branching ſtem, to a great height. It has palmated leaves, ſix or eight inches long and as much broad, divided into five large ſegments, having the ſide ones cut into two ſmaller, green above, and pale underneath; and long pendulous pedunculi, each ſuſtaining ſeveral round heads of cloſe-fitting very ſmall flowers; ſucceeded by numerous downy ſeeds, collected into round, rough, hard balls. It is a native of Aſia and many parts of the eaſt, and grows in great plenty in the Levant. 2. The occidentalis, occidental, or weſtern plane-tree, riſes with a ſtraight ſmooth ſtem, to a great height, branching widely around: it has lobated leaves, ſeven or eight inches long, and from nine or ten to twelve or fourteen broad, divided into three large lobes; and very ſmall flowers, collected into round heads, ſucceeded by round, rough, balls of ſeed. It is a native of Virginia, and other parts of North America; where it attains an enormous ſize, and is remarkable for having its ſtem all of an equal girt for a conſiderable length: we have an account of ſome trees being eight or nine yards in circumference, and which when felled afforded 20 loads of wood. The varieties of theſe two ſpecies, are the Spaniſh or middle plane-tree, having remarkably large leaves of three or five narrower ſegments; and the maple-leaved plane-tree, having ſmalleſt leaves, ſomewhat lobated into five ſegments, reſembling the mapple-tree leaf.

All theſe elegant trees are of hardy temperature, ſo as to proſper here in any common ſoil, and expoſure in our open plantations, &c. and are ſome of the moſt deſirable trees of the deciduous tribe. They were in ſingular eſteem among the ancients of the eaſt, for their extraordinary beauty, and the delightful ſhade they afforded by their noble foliage. The leaves commonly expand in May, and fall off early in autumn; and the flowers appear in ſpring, a little before the leaves, being ſucceeded by ſeeds, which in fine ſeaſons frequently ripen here in September. Theſe fine trees have ſingular merit for all ornamental plantations. Their ſtraight growth, regular branching heads, and the lofty ſtature they attain, together with the extraordinary breadth of their luxuriant leaves, render them extremely deſirable furniture to adorn avenues, lawns, parks, and woods; ſome diſpoſed in ranges, ſome as ſingle ſtandards, others in clumps, ſome in groves, &c. They are moſt excellent for ſhade; for it is obſervable, that no tree is better calculated to defend us from the heat in ſummer, by its noble ſpreading foliage, and to admit the ſun's rays more freely in winter, on account of the diſtance of its branches, which is always in proportion to the ſize of the leaves. They may alſo be employed in the collection of the foreſt-trees, in woods, to grow up to timber, in which they will alſo prove advantageous in time. In ſhort, theſe noble trees claim the eſteem of every one concerned in plantations of every kind; but more particularly in extenſive works, where they may be ſo variouſly diſpoſed as to have a charming effect.

The propagation of theſe trees is by ſeed, layers, and cuttings. The ſeeds frequently ripen in theſe parts, and are alſo procured from other countries, and may be obtained of the nurſerymen or ſeedſmen. The beſt ſeaſon for ſowing them is autumn, if they can be then poſſibly procured. Chooſe a ſomewhat ſhady moiſt ſoil: and having dug the ground, and raked it fine, form it into four-feet wide beds, and either ſcatter the ſeeds evenly on the ſurface and rake them in, or previouſly with the back of a rake turn the earth off the ſurface near half an inch deep into the alleys; then ſow the ſeed, and directly, with the rake turned the proper way, draw the earth evenly over the ſeeds, and trim the ſurface ſmooth: many of the plants will riſe in ſpring, and probably may not till the ſpring following. When they are one or two years old, plant them out in nurſery rows, two or three feet aſunder, and about half that diſtance in the lines; here to remain till of a proper ſize for final tranſplantation. The method of propagation by layers is very commonly practiſed in the nurſeries, in default of ſeed, and by which they moſt readily grow; for which purpoſe, ſome ſtout plants for ſtools muſt be planted, which in a year after muſt be headed down near the bottom, that they may throw out many ſhoots near the ground, convenient for laying; which, in the autumn after they are produced, lay by for ſlit-laying; and by autumn after, they will be well rooted, and form plants two or three feet high, ſo may be ſeparated, and planted in nurſery-rows, like the ſeedlings.—All the ſorts will take tolerably by cutting off the ſtrong young ſhoots; but the *platanus occidentalis* more freely than the oriental kind. Autumn is the beſt ſeaſon: as ſoon as the leaf falls, chooſe ſtrong young ſhoots, and plant them in a moiſt ſoil; many of them will grow, and make tolerable plants by next autumn. It ſhould be remarked, that in order to continue the diſtinction of the varieties more effectually, they ſhould be propagated either by layers or cuttings: for when raiſed from ſeed, thoſe of the reſpective ſpecies generally vary.

PLATBAND, in gardening, a border or bed of flowers, along a wall, or the ſide of a parterre, frequently edged with box, &c.

Platband of a door or window, is uſed for the lintel, where that is made ſquare, or not much marked.

PLATE, a term uſed by our ſportſmen to expreſs the reward given to the beſt horſe at our races.

Sportſman's Dictionary.

The winning a plate is not the work of a few days to the owner of the horſe; but great care and preparation is to be made for it, if there is any great dependence on the ſucceſs. A month is the leaſt time that can be allowed to draw the horſe's body clear, and to refine his wind to that degree of perfection that is attainable by art.

It is firſt neceſſary to take an exact view of his body, whether he be low or high in fleſh; and it is alſo neceſſary to conſider whether he be dull and heavy, or briſk and lively, when abroad. If he appear dull and heavy, and there is reaſon to ſuppoſe it is owing to too hard riding, or, as the jockeys expreſs it, to ſome greaſe that has been diſſolved in hunting, and has not been removed by ſcouring, then the proper remedy is half an ounce of diapente given in a pint of good ſack; this will at once remove the cauſe, and revive the creature's ſpirits. After this, for the firſt week of the month, he is to be fed with oats, bread, and ſplit beans; giving him ſometimes the one and ſometimes the other, as he likes beſt; and always leaving ſome in the locker, that he may feed at leiſure when he is left alone. When the groom returns at the feeding-time, whatever is left of this muſt be removed, and freſh given; by this means the creature will ſoon become high ſpirited, wanton, and full of play. Every day he muſt be rode out an airing, and every other day it will be proper to give him a little more exerciſe; but not ſo much as to make him ſweat too much. The beans and oats in this caſe are to be put into a bag, and beaten till the hulls are all off, and then winnowed clean; and the bread, inſtead of being chipped in the common way, is to have the cruſt clean cut off. If the horſe be in good fleſh and ſpirits when taken up for its month's preparation, the diapente muſt be omitted; and the chief buſineſs will be to give him good food, and ſo much exerciſe as will keep him in wind, without over-ſweating him or tiring his ſpirits. When he takes larger exerciſes afterwards, towards the end of the month, it will be proper to have ſome horſes in the place to run againſt him. This will put him upon his mettle, and the beating them will give him ſpirits. This, however, is to be cautiouſly obſerved, that he has not a bloody heat given him for ten days or a fortnight before the plate is to be run for; and that the laſt heat that is given him the day before the race, muſt be in his clothes: this will make him run with greatly more vigour, when ſtripped for the race, and feeling the cold wind on every part.

In the ſecond week, the horſe ſhould have the ſame food, and more exerciſe. In the laſt fortnight, he muſt have dried oats, that have been hulled by beating. After this they are to be wetted in a quantity of whites of eggs beaten up, and then laid out in the ſun to dry; and when as dry as before, the horſe is to have them. This ſort of food is very light of digeſtion, and very good for the creature's wind. The beans in this time ſhould be given more ſparingly, and the bread ſhould be made of three parts wheat and one part beans. If he ſhould become coſtive under this courſe, he muſt then have ſome ale and whites of eggs beaten together: this will cool him, and keep his body moiſt.

In the laſt week the maſh is to be omitted, and barley-water given him in its place, every day, till the day before the race: he ſhould have his fill of hay; then he muſt have it given him more ſparingly, that he may have time to digeſt it; and in the morning of the race day, he muſt have a toaſt or two of white bread ſoaked in ſack, and the ſame juſt before he is led out to the field. This is an excellent method, becauſe the two extremes of fullneſs and faſting are at this time to be equally avoided; the one hurting his wind, and the other occaſioning faintneſs that may make him loſe. After he has had his food, the litter is to be ſhook up, and the ſtable kept quiet, that he may be diſturbed by nothing till he is taken out to run.

PLATFORM, in the military art, an elevation of earth, on which cannon is placed, to fire on the enemy; ſuch are the mounts in the middle of curtins. On the ramparts there is always a platform, where the cannon are mounted. It is made by the heaping up of earth on the rampart, or by an arrangement of madriers, riſing inſenſibly, for the cannon to roll on, either in a caſemate, or on attack in the outworks. All prac-

Platform, Platina.

Platina.

practitioners are agreed, that no ſhot can be depended on, unleſs the piece can be placed on a ſolid platform; for if the platform ſhakes with the firſt impulſe of the powder, the piece muſt likewiſe ſhake, which will alter its directions and render the ſhot uncertain.

Platform, in architecture, is a row of beams, which ſupport the timber-work of a roof, and lie on the top of a wall, where the entablature ought to be raiſed.

This term is alſo uſed for a kind of terrace, or broad ſmooth open walk at the top of a building, from whence a fair proſpect may be taken of the adjacent country. Hence an edifice is ſaid to be covered with a platform, when it is flat at top, and has no ridge. Moſt of the Oriental buildings are thus covered, as were all thoſe of the ancients.

Platform, or *Orlop*, in a man of war, a place on the lower deck, abaft the main maſt, between it and the cockpit, and round about the main capſtan, where proviſion is made for the wounded men in time of action.

PLATINA, a metallic ſubſtance, analogous to the perfect metals, eſpecially to gold, as many properties are common to both.

Although metals, from their great utility, have been always diligently ſearched for, yet this has remained undiſcovered till lately; which is a very ſurpriſing circumſtance, and which ſeems to prove, that platina is not, like the other metals, ſcattered in different parts of the world, and in all climates. Platina is found in the golden mines of Spaniſh America, and chiefly in thoſe of Santa Fé near Carthagena, and in the Bailliwick of Choco in Peru.

This metal was probably known to the workers of theſe mines long before it was brought into Europe: but as its colour is not very fine, and as it is almoſt intractable, eſpecially by fuſion, without addition, they ſeem to have neglected it, conſidering it as ſome refractory mineral or marcaſite: ſome of them, however, had attempted to melt it, and to make toys of it, as tobacco-boxes and other things of that kind; but this muſt certainly have been by allaying it with other metals, as we ſhall ſoon ſee the impoſſibility of their doing it otherwiſe.

Nevertheleſs, this metal continued to be ſo neglected, that it was entirely unknown in Europe till Don Antonio Ulloa, a Spaniſh mathematician, who accompanied the French academicians ſent by the king of France to Peru to determine the figure of the earth by meaſuring a degree of the meridian, firſt mentioned it in the relation of his voyage, printed at Madrid in the year 1748: but he ſays little of it, and repreſents it as an untractable metallic ſtone, which impeded the extraction of gold from the ore when it was in a large quantity. This account was not very likely to excite the curioſity of chemiſts concerning a new perfect metal, and a matter ſo intereſting and ſurpriſing as they afterwards found it to be.

But before that time, that is, in 1741, an Engliſh metallurgiſt, called *Wood*, who had brought from Jamaica ſome ſpecimens of it, which he was informed had come from Carthagena, attended more to it, and made ſome good chemical trials of it. Since that time, ſeveral chemiſts, the chief of which are M. Scheffer, of the Swediſh Academy, and Dr Lewis, of the Royal Society of London, have very particularly examined this ſingular metal, and have publiſhed their experiments. Dr Lewis has in ſome meaſure exhauſted this matter, in four excellent memoirs communicated to the Royal Society. Platina was, nevertheleſs, little known in France till the year 1758, when Mr Morin collected, tranſlated into French, and publiſhed, an account of all that had hitherto been done upon platina, in a work entitled, *Platina, white gold, an eighth metal.*

This publication excited the curioſity of French chemiſts, to whom it was a new and intereſting object; but the difficulty of obtaining a matter ſo dear, prevented all of them from being able to ſatiſfy their deſire of examining it. Meſſrs Macquer and Beaumé were the only perſons who made experiments upon it, which they have publiſhed amongſt the Memoirs of the Academy for the year 1751.

About the ſame time alſo, Mr Margraaf examined platina, and publiſhed a diſſertation concerning it.

Theſe are the only chemiſts who have examined, at leaſt who publiſhed their reſearches concerning this new metal. But although their number be ſmall, yet their experiments are ſo numerous, made with ſuch accuracy, and in general ſo conſiſtent with each other, that, by collecting and comparing them, we may acquire a certain and almoſt as extenſive knowledge of platina as of the other metals that have been known from time immemorial. The moſt general and certain reſults of the experiments made by the above-mentioned chemiſts are the following.

Platina, a Spaniſh word, is a diminutive of *plata*, which in that language ſignifies *ſilver*. It is therefore called by the Spaniards *little ſilver*. This name is improper; ſince it reſembles ſilver only in being indeſtructible, and very imperfectly in its colour. The name of *white gold*, given to it by ſome chemiſts, is more ſuitable: for we ſhall ſee that it reſembles gold more than any one metal reſembles any other; and hence we ſhall chiefly compare it to gold.

We do not certainly know the origin and natural hiſtory of platina. We can only aſſert, that all that we ſee in maſſes, or worked into forms, is not pure nor in its natural ſtate; for we are certain that it is unfuſible, without addition, by the moſt violent fire of our furnaces, unleſs perhaps where the fire is blown up by dephlogiſticated air, or when precipitated from aqua regia, as we ſhall afterwards ſee. All the platina that is found in the cabinets of curious perſons conſiſts of ſmall angular grains, the corners of which are a little rounded. It is mixed with a conſiderable quantity of ſmall black ſand, as attractable by magnets as the beſt iron, but unſoluble by acids, unfuſible, and untractable. This ſand is perfectly ſimilar to that which is found at St Quay in Bretagne. The grains of platina are alſo frequently interſperſed with particles of ſpar and of quartz, and ſometimes with ſpangles of gold. Meſſrs Macquer and Beaumé found a pretty large ſpangle of gold in the platina examined by them. But theſe heterogeneous matters are quite foreign to platina, and are not combined with it; for it contains nothing extraneous excepting a little gold and mercury, which latter ſubſtance it probably receives during the operations for extracting gold from the ores by the means of mercury. Theſe matters may eaſily be ſeparated from the platina without decompoſing it, by waſhing and by magnets. Some chemiſts, who know platina only by name, and deny that it is a peculiar metal, have therefore, with great impropriety, advanced, that Mr Margraaf had decompoſed it, and had obtained from it gold, iron, and arſenic. The contrary appears from Mr Margraaf's Diſſertation. Mr Margraaf only ſeparated the heterogeneous matters which were merely mixed with platina, as other chemiſts have done; but he is too good a chemiſt to pretend that he has decompoſed it: on the contrary, he does not heſitate to call it a *perfect metal*, which name is alſo given to it by all who underſtand metals.

The colour of the grains of platina is metallic, white, livid, not very brilliant, intermediate betwixt the white of ſilver and the grey of iron. At firſt view they reſemble large filings of iron. They are ſmooth, and are nearly as hard as iron; they are ſomewhat ductile; ſo that ſome of them may be flattened upon an anvil, while others are bruiſed into ſmall pieces.

The ſpecific gravity of platina is very great, and nearly equal to that of gold. In water it loſes only ſomething betwixt an eighteenth and a nineteenth part of its weight.

The tenacity of the parts of this metal has not been determined, becauſe it cannot be formed into a proper figure to make the experiment. But if this quality is proportionable to the ductility and hardneſs of metals, we may preſume, that as platina is much harder than gold, its tenacity is alſo greater, if all the ductility of which it ſeems ſuſceptible could be given to it by art.

Platina is, like pure gold and ſilver, free from all ſmell and taſte. It is unalterable by the combined action of air and water, and is no more ſuſceptible than the other perfect metals of acquiring ruſt. Like them alſo it is indeſtructible by the moſt violent and long-continued fire: but the property which peculiarly diſtinguiſhes this metal is its unfuſibility by the moſt intenſe heat.

As fuſion is neceſſary for the application of metals to uſe, chemiſts have made their utmoſt efforts to melt platina. The moſt violent heat which could be raiſed in air-furnaces, or by the united action of ſeveral large bellows, has been applied repeatedly, and continued a long time, without ſucceſs. In all theſe trials, the grains of platina remained unaltered in form and weight, and were only agglutinated to each other, nearly as ſand is by expoſure to violent heat, but ſo ſlightly, that by the ſmalleſt effort they were ſeparable. Meſſrs Macquer and Beaumé expoſed platina during five days and five nights to the greateſt heat of a glaſs-houſe furnace, which trial did only confirm the unfuſibility and unalterability of platina by ordinary fires, as it was found to be only a little agglutinated, and its weight to be a little increaſed; which latter phenomenon has been alſo obſerved by Mr Margraaf, and which was undoubtedly owing to the fixed air abſorbed by the calces of the imperfect metals mixed with it. Laſtly, Meſſrs Macquer and Beaumé, having expoſed platina to the focus of a large burning-glaſs, melted a little of it in a minute. It firſt ſmoked, then emitted ſparks, and thoſe parts of it melted well which were expoſed to the centre of the focus. Theſe chemiſts carefully examined the properties of this platina. According to their memoir, the melted parts were diſtinguiſhable from the others by a brilliancy like that of ſilver, and by a rounded, ſhining, poliſhed ſurface. They were eaſily flattened upon an anvil, and formed into very thin plates without cracking or ſplitting; ſo that theſe grains ſeemed to be much more malleable than platina in its natural ſtate. Theſe metals by repeated ſtrokes of the hammer became hard and brittle, as all other metals do, particularly gold and ſilver; and by annealing, their malleability was reſtored, as it is alſo to other metals by the ſame means. After experiments ſo certain and well authenticated, we cannot doubt that platina is truly a metal, and even a third metal, as perfect in its kind as gold and ſilver are in theirs. This propoſition will be further confirmed by the other properties of platina.

Platina reſiſts as perfectly as gold the action of the vitriolic, marine, or nitrous acids; in a word, of any pure acid, in whatever manner applied. Theſe acids, concentrated or diluted, may be boiled any length of time upon platina without diſſolving an atom of it: but a mixture of nitrous and marine acids, aqua regia, the ſolvent of gold, is alſo the ſolvent of platina. Meſſrs Macquer and Beaumé have obſerved, that an aqua regia compoſed of equal parts of the two acids diſſolves moſt of this metal. But, however the aqua regia is made, more of it is required to diſſolve platina than gold. Theſe chemiſts employed a pound of aqua regia to diſſolve an ounce of platina. All the acid of this quantity of aqua regia was not indeed employed to diſſolve the platina, becauſe much of it was diſſipated in vapours during the operation, from the long time employed in the ſolution; and therefore, if the operation had been performed in cloſe veſſels, and by diſtillation and cohobation, as Dr Lewis did, a leſs quantity of aqua regia would have been ſufficient: but this is a matter of ſmall importance.

Aqua regia requires to be aſſiſted by the heat of a ſand-bath, and alſo a conſiderable time, to diſſolve platina well. Although the colour of this metal is white, its ſolution is very yellow, even deeper than that of gold. When a ſmall quantity of platina only is diſſolved in aqua regia, or when a ſaturated ſolution is much diluted, a beautiful yellow colour is produced, undiſtinguiſhable from that of a ſolution of gold: but while the aqua regia becomes more and more ſaturated with platina, its colour becomes more and more intenſe, and at laſt red; but this apparent redneſs evidently proceeds from nothing but the intenſity of the yellow colour; for this ſaturated ſolution is rendered yellow by dilution with water. In this circumſtance it is ſimilar to tincture of ſaffron.

The ſolution of platina in aqua regia is acid and corroſive, and from it a neutral cryſtallizable ſalt may be obtained. When the acids employed are concentrated, and when the ſolution is nearly ſaturated, a confuſed cryſtallization is formed at the bottom of the matraſs, which may be found to be a heap of very ſmall, yellow, tranſparent cryſtals. Theſe cryſtals of platina may be obtained much larger and more beautiful by evaporating the ſolution of platina with a very ſlow fire, and by cooling it very ſlowly. The ſolution of platina tinges the ſkin and other animal matters with a blackiſh brown colour in certain circumſtances, (in which reſpect it reſembles the ſolutions of gold, ſilver, and of mercury); and ether mixed with this ſolution by agitation quickly ſeparates from it, and becomes tinged with a fine yellow colour, preciſely as it does when it is treated in the ſame manner with a ſolution of gold. This experiment ſhews, that ether, and probably other attenuated oily matters, take platina, as they do gold, for aqua regia; and hence we may perceive another inſtance of the conformity of thoſe two metals. But as ether does not acquire nearly ſo intenſe a colour as the ſolution of platina, we may infer that it only receives a ſmall quantity of this metal. Beſides, the platina ſoon ſeparates ſpontaneouſly from the ether.

Platina may be precipitated from its ſolvent by fixed and volatile alkalis: and theſe precipitates are all of a yellow brick-colour, when only ſo much alkali is employed as is neceſſary to ſaturate the acid of the ſolution; but are of a paler colour when a ſuperabundant quantity of alkali is employed, or when they are digeſted in alkali. Mr Margraaf mentions a very ſingular fact concerning the precipitation of platina by alkalis; namely, that although vegetable fixed alkali, and even volatile alkali, precipitated this metal from aqua regia; yet the mineral alkali, though in other inſtances equal in power of union to the former alkali, and ſuperior to the latter, produced no precipitation, even when ſo much of it was added as to ſaturate the acid, nor even diſturbed the tranſparency of the liquor. The above colours of precipitates of platina, according to Mr Macquer, proceed from a large quantity of ſaline matters which precipitate along with them, and which ſtrongly adhere to them, and not from any calcination of this metal, or loſs of its phlogiſton. The proof of this is, that if the cryſtals or preciptates of platina be expoſed to ſtrong heat, the ſaline matters which adhere to them are expelled, the colour occaſioned by them is loſt, and the platina recovers, without any addition, its ordinary metallic ſtate.—However, there is no reaſon here to ſuppoſe an adheſion of ſaline matter to the precipitate, which never can be proved, and beſides is very improbable, ſince we know not any ſubſtance which has ſo great an attraction for ſalts as water. Under the article Phlogiston, it is explained how the calx of a metal may be revived merely by heat, without any apparent addition of phlogiſtic matter.

All the above-mentioned phenomena exhibited by platina treated with acids and alkalis are ſimilar to thoſe which gold exhibits in ſimilar circumſtances: but platina has alſo in this reſpect ſome peculiar properties, by which it differs from gold. 1. The ſolution of platina aquires a deeper colour than that of gold. 2. The precipitate of platina made by volatile alkali does not fulminate as that of gold does. 3. Tin does not produce from the ſolution of platina a purple precipitate, capable of tinging glaſs, as it does from a ſolution of gold.

Neither nitre, which quickly and effectually calcines all imperfect metals; nor corroſive ſublimate, the acid of which, being very much concentrated, acts upon almoſt all metals; nor any other neutral ſalt, could occaſion the ſmalleſt alteration upon platina or upon gold.

This ſingular metal reſiſts, as well as gold does, the action of ſulphur, which ſo powerfully diſſolves other metals. From Dr Lewis's experiments we find, that liver of ſulphur is capable of diſſolving platina, as it does alſo gold, by fuſion. Mr Margraaf's experiments leave this matter uncertain: but if, as we have reaſon to believe, liver of ſulphur does diſſolve platina, this is another inſtance of the conformity of this metal with gold.

Almoſt all metallic ſubſtances are capable of ſeparating platina from aqua regia, as they alſo ſeparate gold. Platina precipitated by theſe ſubſtances has its metallic appearance. In this reſpect it conforms with a general rule, that metals precipitated by other metals have their metallic appearance.

Mr Margraaf relates, in his memoir, a great number of experiments which he made to diſcover the effects of mixing a ſolution of platina with other metallic ſolutions, and alſo of digeſting pure platina with theſe ſolutions and other ſaline ſubſtances. Theſe experiments furniſhed many curious and intereſting facts; but as ſeveral of them do not ſeem to be conſiſtent with the eſſential and aſcertained properties of platina, nor even with ſimilar experiments made by other chemiſts, there ſeems reaſon to believe that theſe ſingularities obſerved by this able chemiſt proceeded from ſome extraneous matters with which his platina was allayed. From moſt of theſe experiments, as, for inſtance, from the yellow flowers obtained by ſubliming platina with ſal ammoniac, and from the blue precipitate formed by mixing his ſolution of platina with a lixivium of Pruſſian blue, we may conclude, that iron was the metal with which his platina was allayed, as he himſelf ſays.

Platina, like gold, is capable of being allayed with all metals, and in theſe allays exhibits intereſting phenomena. Dr Lewis has examined theſe allays more carefully and fully than any other perſon. The following is an epitome of Dr Lewis's obſervations on the ſubject.

Platina, although very unfuſible when alone, may however be fuſed along with other metals with which it is capable of combining. Equal parts of gold and platina may be melted in a violent fire, and the allay which is formed may be eaſily poured into an ingot mould. It is whitiſh, hard, and may be broken by a violent blow. Neverthleſs, when it has been well annealed, it is capable of conſiderable extenſion under the hammer. One part of platina and four parts of gold may be melted and allayed with a much leſs fire than is requiſite in the preceding experiment. This allay is ſo ductile, that it may be extended into very thin plates, without being broken, or even ſplit at the edges. Dr Lewis obſerved a remarkable circumſtance concerning this allay, namely, that the platina, which was $\frac{1}{5}$ of the whole maſs, rendered the gold no paler than guineas are, which contain only $\frac{1}{11}$ of ſilver.

Silver and platina may be melted and allayed together in equal parts with a very violent fire. The allay which is formed is much harder and darker-coloured than ſilver, and of a large grain, although it preſerves ſome ductility.* Theſe qualities are leſs ſenſible when one part of platina is added to ſeven parts of the ſilver;

but this allay is ſtill coarſer-grained and leſs white than ſilver. This coarſeneſs of grain ſhows an imperfect union: and indeed ſilver and platina do not ſeem to unite very intimately; for Dr Lewis obſerves, that when the allay of theſe two metals was left after fuſion in the crucible, a conſiderable part of the platina was ſeparated and ſunk to the bottom. The platina did not appear to communicate any good quality to the ſilver, excepting a greater hardneſs.

Copper ſeems to be moſt improved by being allayed with platina. When indeed a large proportion of platina is added to copper, as equal parts or two-thirds, the allay is hard, brittle, and coarſe; but when a leſs quantity of platina is added, as from $\frac{1}{6}$ to $\frac{1}{25}$, or even leſs, a golden-coloured copper is produced, very malleable, harder, ſuſceptible of a finer poliſh, ſmoother-grained, and much leſs ſubject to calcination and ruſt, than pure copper.

Dr Lewis was not able to fuſe forged iron with platina; which is not ſupriſing, when we conſider the refractory qualities of theſe two metals: but he allayed platina with caſt-iron, by throwing one part of platina to four parts or more of the iron when it was juſt beginning to flow. This allay was much harder, and much-leſs ſubject to ruſt, than pure iron. It was ſuſceptible of a very fine poliſh.

Platina may be melted with tin in all proportions, from equal parts of the two metals to 24 parts of tin. This allay was obſerved to be ſo much harder, more brittle, more dark-coloured, and coarſer, as the proportion of the platina was larger. No advantage ſeemed to be acquirable by this allay. Lead alſo may be allayed in different proportions with platina, nearly as tin may; with this difference, that a much greater fire is neceſſary for the formation of this latter allay, particularly when the quantity of platina is great. The metal reſulting from it has a dark colour, ſomewhat approaching to a purple or violet, or it eaſily acquires theſe colours when expoſed to the air. When the two metals fuſed together are left in a crucible to cool, a conſiderable part of the platina ſeparates and falls to the bottom, in the ſame manner as it does from the allay of ſilver.

From Dr Lewis's experiments, platina appears to be capable of amalgamating with mercury, but difficultly, and by a very long trituration with water, as, for inſtance, during a week.

If mercury be triturated with an allay of gold and platina, it ſeizes the gold, and does not touch the platina. Dr Lewis propoſes this amalgamation as a method of ſeparating theſe two metals; and it is that which is employed in the ores of Peru, in which gold and platina are mixed together: but we do not yet know whether this ſeparation be perfectly complete.

Platina may be allayed with biſmuth nearly as with with lead, and in a ſimilar manner ſeparates from the biſmuth after fuſion. It gives to biſmuth alſo, as it does to lead, the property of acquiring, by expoſure to air, violet, purple, or blue colours. This allay is always very brittle.

Of all metallic matters, zinc may be moſt eaſily allayed with platina, and moſt effectually diſſolved by fuſion. Dr Lewis obſerved, that theſe allays did not appear very different from pure zinc; but that when the proportion of platina is conſiderable, their grain is cloſer, their colour leſs clear and more bluiſh, than of zinc. They do not tarniſh nor change colours by expoſure to air. Laſtly, they are harder than zinc, and have not the ſemi-malleability of this ſemi-metal.

With regulus of antimony platina formed a darker and harder compound than the pure regulus.

Dr Lewis has combined platina at the ſame time with two metallic matters, ſuch as with braſs compoſed of copper and zinc, and with bronze compoſed of copper and tin. The moſt ſingular phenomenon of this latter allay was, that the copper and tin acting conjointly upon the platina were capable of diſſolving more of it than they both could do ſeparately. This allay was hard, and capable of receiving a fine poliſh, but is ſubject to tarniſh; which ſeems to happen to all the allays of tin or of lead with platina.

Equal parts of platina and braſs formed a compound very hard and very brittle, capable of receiving a very fine poliſh, and not ſubject to tarniſh. It is poſſible, therefore, that it might be employed for ſpeculums of teleſcopes, and would be much preferable to thoſe now uſed; all which have the great diſadvantage of tarniſhing by expoſure to air, and even very quickly.

Dr Lewis does not mention the effects of allaying platina with arſenic; but Mr Scheffer affirms, that if only a twentieth part of arſenic be added to platina when red-hot in a crucible, theſe two ſubſtances will be perfectly fuſed, and will form a brittle gray maſs. This remarkable experiment requires confirmation; for Mr Margraaf, having alſo treated theſe two matters together, did not perceive any ſuch action of arſenic upon platina. From one of his experiments we find, that having expoſed to a violent fire during an hour a mixture of an ounce of platina with a fuſible glaſs, compoſed of eight ounces of minium, two ounces of flints, and one ounce of white arſenic, he obtained a regulus of platina, well united and fuſed, which weighed an ounce and 32 grains, the ſurface of which was ſmooth, white and ſhining, and the internal parts grey, but which nevertheleſs appeared ſufficiently white when it was filed.

The cupellation of platina was one of the moſt important experiments to be made; becauſe if this operation ſucceeded perfectly, we might thereby obtain compact and malleable maſſes of pure platina, in the ſame ſtate as a metal which had been well fuſed, and of which all ſorts of utenſils might be made, if not by caſting it, at leaſt by forging. All the chemiſts who have examined this metal, and particularly Dr Lewis, have uſed their utmoſt endeavours to cupel it well. But although they have uſed every expedient to apply the ſtrongeſt heat, they have not perfectly ſucceeded. The ſcorification proceeds well at the beginning of the operation, as when gold and ſilver are cupelled: but the cupellation afterwards becomes more and more difficult; becauſe, as the quantity of lead diminiſhes, the matter becomes leſs and leſs fuſible, and at laſt ceaſes to be fluid, notwithſtanding the moſt violent heat; and alſo becauſe, when the quantity of platina is greater than that of the lead, this latter metal is protected, and is not converted into litharge. Hence the regulus obtained is always dark-coloured, rough, adhering to the cupel, brittle, and weighing more than the platina originally employed, from the lead which remains united with it. Meſſ. Macquer and Beaumé appear nevertheleſs to have carried this experiment further than any other chemiſts, as they kept the matter expoſed to a violent fire during a longer time, that is, about 50 hours ſucceſſively: therefore, although their platina was tarniſhed and rough on its ſurface, it was internally white and ſhining, eaſily ſeparable from the cupel, and a little diminiſhed in weight; a certain proof that no lead remained in it. This platina was alſo ductile, and capable of extenſion under the hammer.

Cupellation is therefore a certain method of applying platina to uſe, and of forming it into utenſils.

Some further and very important experiments have been made on this ſingular metallic ſubſtance by Meſſ. Buffon, De Liſle, and Morveau. M. Buffon ſeparated, by means of a magnet, ſix parts out of ſeven of a parcel of platina. He diſtinguiſhed two different matters in platina; of which one is black, friable, and attractable by magnets; and the other conſiſts of larger grains, is of a livid white or yellowiſh colour, much leſs attractable, and is extenſible. Between theſe two different matters are many intermediate particles, ſome partaking more of the former, and ſome of the latter. He thinks that the black matter is chiefly iron; and he ſays, that he has obſerved a ſimilar black powder in many ores of iron. M. Morveau found, that a Pruſſian blue could be obtained from the black part of the platina, by pouring upon it ſpirit of nitre, and afterwards adding to the ſolution diluted ſome phlogiſticated alkali; and that the particles of platina which could not be attracted by magnets, did not by this method ſhew any ſign of their containing iron.

But the moſt important diſcovery that has been made concerning platina, is a method of melting it, by which it becomes a perfect metal, malleable, and denſer than gold. M. De Liſle effected this, by diſſolving crude platina in aqua regia, precipitating it from the acid menſtruum by ſal ammoniac, and by fuſing this precipitate, without addition, in a double crucible, expoſed to the intenſe heat of a forge-fire excited by double bellows. M. Morveau has repeated this experiment. From 72 grains of platina he obtained a regulus, which weighed 50½ grains, and ſeemed to have undergone a very imperfect fuſion; for it did not adhere to the crucible, nor take its form, but ſeemed to be the platina merely revived. Its ſpecific gravity alſo was found to be to that of water no more than as 10.045 to 1. But it was found to be nearly as malleable as ſilver; and when it had been ſufficiently hammered, its ſpecific gravity was found to be to water as 20.170 to 1. M. Morveau found that he could melt the precipitate with ſeveral fluxes; ſuch as, a mixture of white glaſs, borax, and charcoal, and a mixture of white glaſs and neutral arſenical ſalt; and that the regulus thus obtained was more completely fuſed, but was not malleable, and was capable of being attracted by magnets; whereas the regulus obtained without addition did not give this mark of containing iron. He further found, that by means of the above-mentioned flux of white glaſs, borax, and charcoal, he could melt crude platina, and could allay together platina and ſteel in various proportions.

The ſciences, commerce, and arts, muſt receive great advantages from the application of a new perfect metal to uſeful purpoſes, which to the fixity and indeſtructibility of gold, unites a hardneſs and ſolidity almoſt equal to thoſe of iron; which is unalterable by the action of water and air; is not ſubject to ruſt; and reſiſts, as well as glaſs or earthen veſſels, all ſalts, even aquafortis and other pure acids. It is to be regretted, that, although large quantities of it are found in America, it is ſo exceedingly rare here.

The cauſe of this great ſcarcity of platina is, that the Spaniſh miniſtry have prohibited the ſale of it, or the extraction of it from the mines. Theſe prohibitions were certainly from good motives and wiſe intentions: for this metal was no ſooner known, than it was employed for the adulteration of gold; for which purpoſe it is very fit, as it ſuſtains all the ordinary trials of gold, has the ſame ſpecific gravity, and renders gold much leſs pale than ſilver. The uſe of a metal with which frauds ſo prejudicial might be committed with impunity, was neceſſarily interdicted: but ſince the beſt chemiſts of Europe have examined platina, they have publiſhed certain and eaſy methods by which the ſmalleſt quantity of platina mixed with gold may be diſcovered, and by which theſe metals may be ſeparated, in whatever proportion they may happen to be united. As a particular detail of theſe methods would exceed our bounds, we ſhall here relate only one of the moſt convenient and leaſt troubleſome. It is founded on a property which gold has, and not platina, of being capable of precipitation from aqua regia by martial vitriol; and upon a property which platina has, and not gold, of being capable of precipitation from aqua regia by ſal ammoniac. When therefore we would diſcover if gold be allayed with platina, let it be diſſolved in aqua regia; and to this ſolution, which will contain both metals, let ſome ſal ammoniac, diſſolved in water, be added; upon which the platina will be precipitated in form of a brick-coloured ſediment. If, on the other ſide, we would know if platina contained any gold, let this platina be diſſolved in aqua regia, and to the ſolution add a ſolution of martial vitriol in water; upon which the liquor will become turbid, and the gold will form a precipitate which may be eaſily ſeparated by decanting and filtrating the liquor.

We may then affirm, that the reaſons which induced the Spaniſh miniſtry to interdict the uſe of platina no longer ſubſiſt; and we hope, that, when they are once convinced of this, ſociety ſhall no longer be deprived of a ſubſtance which may be ſo advantageous to them, and which may be a new ſource of wealth to the crown of Spain, the ſole proprietor of this precious treaſure.

PLATO, a moſt illuſtrious philoſopher of antiquity, was born at Athens about 430 B. C. He was a perſon of very great quality; being deſcended by his father's ſide from royal anceſtors, and by his mother's ſide from Solon. He was educated in a manner ſuitable to his rank: he learned grammar, mathematics, muſic, and painting. In his firſt years he addicted himſelf much to poetry; he wrote odes and dithyrambics firſt, and afterwards epic poetry: which laſt, finding much inferior to Homer's, he burned. Then he betook himſelf to writing tragedies, and had prepared one to contend for the prize at the Olympic theatre: but the day before it ſhould have been preſented, he happened to hear Socrates, and was ſo charmed with his way of diſcourſing, that he not only ſorbore the conteſt at that time, but neglected poetry ever after, and even deſtroyed all his poems.

He was about the 20th year of his age, when he became a follower of Socrates, and began to ſtudy philoſophy, This great maſter, ſoon obſerving in Plato a greater genius than common, was mightily taken with him: he adviſed him to read Homer often; and from thence Plato brought himſelf to conceive and ſpeak of things in a lofty, copious, and ſtriking manner. Plato was equally attached to Socrates: he raiſed a conſiderable ſum of money to procure his releaſe, after he was impriſoned upon the accuſations of his enemies; and when this failed, had the boldneſs to harangue in defence of him to the people, which he began to do ſo pathetically, that the magiſtrates, fearing a tumult, cauſed him to be ſilenced. Eight years he lived with Socrates; in which time he committed, as did Xenophon and his other diſciples, the ſubſtance of his maſter's diſcourſes to writing. Of this he compoſed dialogues; but with ſo great additions of his own, that Socrates, hearing him recite his Lyſis, cried out, "O Hercules! how many things does this young man feign of me!" for, as Laertius adds, many of thoſe things which Plato writ, Socrates never ſpoke.

The philoſophers who were at Athens were ſo alarmed at the death of Socrates, that moſt of them fled the city to avoid the injuſtice and cruelty of the government. Plato, whoſe grief upon this occaſion is ſaid by Plutarch to have been exceſſive, retired to Megara; where he was friendly entertained by Euclid, who had been one of Socrates's firſt ſcholars, till the ſtorm was over. Afterwards he determined to travel in purſuit of knowledge; and from Megara he went to Italy, where he conferred with Eurytus, Philolaus, and Archytas. Theſe were the moſt celebrated of the followers of Pythagoras, whoſe doctrine was then become famous in Greece; and from theſe the Pythagoreans have affirmed that he had all his natural philoſophy. He dived into the moſt profound and myſterious ſecrets of the Pythagoric doctrines; and perceiving other knowledge to be connected with them, he went to Cyrene, where he learned geometry of Theodorus the mathematician. From thence he paſſed into Egypt, to acquaint himſelf with the theology of their prieſts, to ſtudy more nicely the proportions of geometry, and to inſtruct himſelf in aſtronomical obſervations; and having taken a full ſurvey of all the country, he ſettled for ſome time in the province of Sais, learning of the wiſe men there, what they held concerning the univerſe, whether it had a beginning, whether it moved wholly or in part, &c.; and Pauſanias affirms, that he learned from theſe the immortality, and alſo the tranſmigration, of ſouls. Some of the fathers will have it, that he had communication with the books of Moſes, and that he ſtudied under one Sechnuphis, a learned man of Heliopolis, who was a Jew: but there is nothing that can be called evidence for theſe aſſertions. St Auſtin once believed that Plato had ſome conference with Jeremiah; but afterwards diſcovered, that that prophet muſt have been dead at leaſt 60 years before Plato's voyage to Egypt.

Plato's curioſity was not yet ſatisfied. He travelled into Perſia, to conſult the magi about the religion of that country: and he deſigned to have penetrated even to the Indies, and to have learned of the Brachmans their manners and cuſtoms; but the wars in Aſia hindered him.

Being returned to Athens from his travels, he applied to the teaching philoſophy, which at that time was the moſt honourable profeſſion there. He ſet up his ſchool in the academy, a place of exerciſe in the ſuburbs of the city, beſet with woods; and this, not being a very healthy ſituation, brought a quartan ague on him, which laſted 18 months. The phyſicians adviſed him to remove to the Lycæum; but he refuſed, and anſwered, "I would not live on the top of Athos, to linger away life:" and it was from the academy, that his ſect took the name of *Academics*. Yet ſettled as he was, he afterwards made ſeveral voyages abroad: one particularly to Sicily, in order to view the fiery ebullitions of Mount Ætna. Dionyſius the tyrant reigned then at Syracuſe; a very bad man; for, as Cicero relates, after he had robbed a temple at Locris, and was returning by ſea to Sicily with a proſperous gale, he ſaid to his companions, "You ſee, my friends, how the gods favour ſacrilege." Plato went to ſee him; but inſtead of flattering him like a courtier, reproved him for the diſorders of his court and the injuſtice of his government. The tyrant, not uſed to diſagreeable truths, grew enraged at Plato; and would have put him to death, if Dion and Ariſtomenes, formerly his ſcholars, and then favourites of that prince, had not powerfully interceded in his behalf. Dionyſius was content to deliver him into the hands of an envoy of the Lacedæmonians, who were then at war with the Athenians; and this envoy, touching upon the coaſt of Ægina, ſold him for a ſlave to a merchant of Cyrene, who as ſoon as he had bought him ſent him away to Athens. Some time after, he made a ſecond voyage into Sicily in the reign of Dionyſius the Younger; who ſent Dion, his miniſter and favourite, to invite him to court, that he might learn from him the art of governing his people well. Plato accepted the invitation, and went; but the intimacy between Dion and Plato raiſing jealouſy in the tyrant, the former was diſgraced, and the latter ſent back to Athens.

His fame was now ſpread far and wide; and ſeveral ſtates, among which were the Arcadians and Thebans, ſent ambaſſadors with earneſt requeſts that he would come over, not only to inſtruct the young men in philoſophy, but alſo to preſcribe them laws of government. The Cyrenians, Syracuſians, Cretans, and Eleans, ſent alſo to him: he did not go to any of them, but gave laws and rules of governing to all. He lived ſingle, yet ſoberly and chaſtly. He was a man of great virtues, and exceedingly affable; of which we need no greater proof, than his civil manner of converſing with the philoſophers of his own times, when pride and envy were at their height. His behaviour to Diogenes is always mentioned in his hiſtory. The Cynic was vaſtly offended, it ſeems, at the politeneſs and fine taſte of Plato, and uſed to catch all opportunities of ſnarling at him. He dined one day at his table with other company, and, trampling upon the tapeſtry with his dirty feet, uttered this brutiſh ſarcaſm, "I trample upon the pride of Plato;" to which Plato wiſely reparteed, "With greater pride."

The fame of Plato drew diſciples to him from all parts: among whom were Speuſippus, an Athenian, his ſiſter's ſon, whom he appointed his ſucceſſor in the academy; the great Ariſtotle; two ladies, Laſthenia a Mantinian, and Axiothia a Phliaſian, who went habited as men, and thereby gave occaſion to injurious ſuſpicions of Plato; Hyperides, Demoſthenes, and Iſocrates, with the laſt of whom Plato was very intimate. In the mean time, as his great reputation gained him on the one hand many diſciples and admirers, ſo on the other it raiſed him ſome emulators, eſpecially among his fellow-diſciples, the followers of Socrates. Xenophon and he were particularly diſaffected towards each other; and their emulation appears in nothing more than in their having written upon the ſame ſubjects. They both writ a Sympoſium: they both writ about Socrates: they both writ upon government; for the Commonwealth of Plato, and the Inſtitution of Cyrus, are works of the ſame nature; the latter being pronounced by Cicero, as much a work of invention as the former.

This extraordinary man, being arrived at 81 years of age, died a very eaſy and peaceable death, in the midſt of an entertainment, according to ſome; but, according to Cicero, as he was writing. Both the life and death of this philoſopher were calm and undiſturbed; and indeed he was finely compoſed for happineſs. Beſides the advantages of a noble birth, he had a large and comprehenſive underſtanding, a vaſt fund of wit and good taſte, great evenneſs and ſweetneſs of temper, all cultivated and refined by education and travel; ſo that it is no wonder if he was honoured by his countrymen, eſteemed by ſtrangers, and adored by his ſcholars. The ancients thought more highly of Plato than of all their philoſophers: they always called him the *Divine Plato*, and they ſeemed reſolved that his deſcent ſhould be more than human. "There are (ſays Apuleius) who aſſert Plato to have been ſprung from a more ſublime conception; and that his mother Perictione, who was a very beautiful woman, was impregnated by Apollo in the ſhape of a ſpectre." Plutarch, Suidas, and others, affirm this to have been the common report at Athens. When he was an infant, his father Ariſto went to Hymettus, with his wife and child, to ſacrifice to the muſes; and while they were buſied in the divine rites, a ſwarm of bees came and diſtilled their honey upon his lips. This, ſays Tully, was conſidered as a preſage of his future eloquence. Apuleius relates, that Socrates, the night before Plato was recommended to him, dreamed that a young ſwan fled from Cupid's altar in the academy, and ſettled in his lap, thence ſoared to heaven, and delighted the gods with its muſic: and when Ariſto the next day preſented Plato to him, "Friends (ſays Socrates), this is the ſwan of Cupid's academy." The Greeks loved fables: they ſhow however in the preſent caſe, what exceeding reſpect was paid to the memory of Plato. Tully perfectly adored him; tells us, how he was juſtly called by Panætius the *divine*, the *moſt wiſe*, the *moſt ſacred*, the *Homer of philoſophers;* entitled him to Atticus, *Deus ille noſter;* thinks, that if Jupiter had ſpoken Greek, he would have ſpoken in Plato's language; and made him ſo implicitly his guide in wiſdom and philoſophy, as to declare, that he had rather err with Plato than be right with any one elſe. But, panegyric aſide, Plato was certainly a very wonderful man, of a large and comprehenſive mind, an imagination infinitely fertile, and of a moſt flowing and copious eloquence. Nevertheleſs, the ſtrength and heat of fancy prevailing in his compoſition over judgment, he was too apt to ſoar beyond the limits of earthly things, to range in the imaginary regions of general and abſtracted ideas; and on which account, though there is always a greatneſs and ſublimity in his manner, he did not philoſophiſe ſo much according to truth and nature as Ariſtotle, though Cicero did not ſcruple to give him the preference.

The writings of Plato are all in the way of dialogue; where he ſeems to deliver nothing for himſelf, but every thing as the ſentiments and opinions of others, of Socrates chiefly, of Timæus, &c. He does not mention himſelf any where, except once in his Phædo, and another time in his Apology for Socrates. His ſtyle, as Ariſtotle obſerved, is betwixt proſe and verſe: on which account, ſome have not ſcrupled to rank him with the poets. There is a better reaſon for ſo doing, than the elevation and grandeur of his ſtyle: his matter is oftentimes the offspring of imagination, inſtead of doctrines or truths deduced from nature. The firſt edition of Plato's works in Greek was put out by Aldus at Venice in 1513: but a Latin verſion of him by Marſilius Ficinus had been printed there in 1491. They were re-printed together at Lyons in 1588, and at Francfort in 1602. The famous printer Henry Stephens, in 1578, gave a moſt beautiful and correct edition of Plato's works at Paris, with a new Latin verſion by Serranus, in three volumes folio; and this deſervedly paſſes for the beſt edition of Plato: yet Serranus's verſion is very exceptionable, and in many reſpects, if not in all, inferior to that of Ficinus.

PLATONIC, ſomething that relates to Plato, his ſchool-philoſophy, opinions, or the like. Thus, platonic love denotes a pure ſpiritual affection, for which Plato was a great advocate, ſubſiſting between the different ſexes, abſtracted from all carnal appetites, and regarding no other object but the mind and its beauties: or it is even a ſincere diſintereſted friendſhip ſubſiſting between perſons of the ſame ſex, abſtracted from any ſelfiſh views, and regarding no other object than the perſon, if any ſuch love or friendſhip has aught of a foundation in nature.

PLATONIC *Year*, or the *Great Year*, is a period of time determined by the revolution of the equinoxes, or the ſpace wherein the ſtars and conſtellations return to their former places, in reſpect of the equinoxes. The platonic year, according to Tycho Brahe, is 25816, according to Ricciolus 25920, and according to Caſſini 24800 years.

This period once accompliſhed, it was an opinion among the ancients, that the world was to begin anew, and the ſame ſeries of things to turn over again.

PLATONISM, the doctrine and ſentiments of Plato and his followers, with regard to philoſophy, &c.

In phyſics, Plato followed Heraclitus; in ethics and politics, Socrates; and in metaphyſics he followed Pythagoras. His diſciples were called *academics*. See the articles ACADEMIC, &c.

The Platonic philoſophy is thought very conſiſtent with the Moſaic; and a great many of the primitive fathers follow the opinions of that philoſopher, as being favourable to Chriſtianity. Juſtin is of opinion, that Plato could not learn many things which he has ſaid in his works, from mere natural reaſon; but thinks he might have learned them from the books of Moſes, which he might have read when in Egypt.

PLAUTUS (Marcus Accius), a comic writer of ancient Rome, born at Umbria, a province of Italy. His proper name was *Marcus Accius*, and he is ſuppoſed to have acquired the ſurname of *Plautus* from having ſplay feet. His parentage appears to have been mean; ſo that ſome have thought he was the ſon of a ſlave. Aulus Gellius ſays that Plautus was diſtinguiſhed for his poetry on the theatre, and Cato for his eloquence in the Forum, at the ſame time; and obſerves elſewhere from Varro, that he was ſo well paid for his plays, as to double his ſtock in trading, in which he loſt all he gained by the muſes. He is ſaid to have been reduced to work at a mill for his ſubſiſtence; but Varro adds, that his wit was his beſt ſupport, as he compoſed three of his plays during this drudgery. He died in the firſt year of the elder Cato's cenſorſhip, about the year of Rome 569, and 184 B. C. We have 20 of his plays extant, though not all of them entire. Five of them comedies have been elegantly tranſlated into Engliſh by Mr B. Thornton, and publiſhed in 2 vols 8vo. 1767.

PLEA, in law, is what either party alleges for himſelf in court, in a cauſe there depending; and in a more reſtrained ſenſe, it is the defendant's anſwer to the plaintiff's declaration.

Pleas are uſually divided into thoſe of the crown, and common pleas. Pleas of the crown are all ſuits in the king's name, or in the name of the attorney-general in behalf of the king, for offences committed againſt his crown and dignity, and againſt his peace; as treaſon, murder, felony, &c. See ARRAIGNMENT.

Blackſt. Comment.

Common pleas are ſuch ſuits as are carried on between common perſons in civil caſes. Theſe pleas are of two ſorts; *dilatory* pleas, and pleas *to the action*. Dilatory pleas are ſuch as tend merely to delay or put off the ſuit, by queſtioning the propriety of the remedy, rather than by denying the injury: pleas to the action are ſuch as diſpute the very cauſe of ſuit.

I. *Dilatory* pleas are, 1. To the juriſdiction of the court: alleging, that it ought not to hold plea of this injury, it ariſing in Wales or beyond ſea; or becauſe the land in queſtion is of ancient demeſne, and ought only to be demanded in the lord's court, &c. 2. To the diſability of the plaintiff, by reaſon whereof he is incapable to commence or continue the ſuit; as, that he is an alien enemy, outlawed, excommunicated, attainted of treaſon or felony, under a præmunire, not *in rerum natura* (being only a fictitious perſon), an infant, a feme-covert, or a monk profeſſed. 3. In abatement: which abatement is either of the writ, or the count, for ſome defect in one of them; as by miſnaming the defendant, which is called a *miſnomer;* giving him a wrong addition, as eſquire inſtead of knight; or other want of form in any material reſpect. Or, it may be that the plaintiff is dead; for the death of either party is at once an abatement of the ſuit.

Theſe pleas to the juriſdiction, to the diſability, or in abatement, were formerly very often uſed as mere dilatory pleas, without any foundation in truth, and calculated only for delay; but now by ſtat. 4 & 5 Ann. c. 16. no dilatory plea is to be admitted without affidavit made of the truth thereof, or ſome probable matter ſhown to the court to induce them to believe it true. And with reſpect to the pleas themſelves, it is a rule, that no exception ſhall be admitted againſt a declaration or writ, unleſs the defendant will in the ſame plea give the plaintiff a better; that is, ſhew him how it might be amended, that there may not be two objections upon the ſame account.

All pleas to the juriſdiction conclude to the cognizance of the court; praying “judgment whether the court will have farther cognizance of the ſuit.” Pleas to the diſability conclude to the perſon; by praying “judgment, if the ſaid A the plaintiff ought to be anſwered:” And pleas in abatement (when the ſuit is by original) conclude to the writ or declaration; by praying “judgment of the writ, or declaration, and that the ſame may be quaſhed,” *caſſetur*, made void, or abated: but if the action be by bill, the plea muſt pray “judgment of the bill,” and not of the declaration; the bill being here the original, and the declaration only a copy of the bill.

When theſe dilatory pleas are allowed, the cauſe is either diſmiſſed from that juriſdiction, or the plaintiff is ſtayed till his diſability be removed; or he is obliged to ſue out a new writ, by leave obtained from the court, or to amend and new-frame his declaration. But when, on the other hand, they are overruled as frivolous, the defendant has judgment of *reſpondeat ouſter*, or to anſwer over in ſome better manner. It is then incumbent on him to plead.

2. A plea *to the action;* that is, to anſwer to the merits of the complaint. This is done by confeſſing or denying it.

A confeſſion of the whole complaint is not very uſual, for then the defendant would probably end the matter ſooner; or not plead at all, but ſuffer judgment to go by default. Yet ſometimes, after tender and refuſal of a debt, if the creditor haraſſes his debtor with an action, it then becomes neceſſary for the defendant to acknowledge the debt, and plead the tender; adding that he has always been ready, *tout temps priſt*, and ſtill is ready, *uncore priſt*, to diſcharge it: for a tender by the debtor and refuſal by the creditor will in all caſes diſcharge the coſts, but not the debt itſelf; though in ſome particular caſes the creditor will totally loſe his money. But frequently the defendant confeſſes one part of the complaint (by a *cognovit actionem* in reſpect thereof), and traverſes or denies the reſt; in order to avoid the expenſe of carrying that part to a formal trial, which he has no ground to litigate. A ſpecies of this ſort of confeſſion is the *payment of money into court:* which is for the moſt part neceſſary upon pleading a tender, and is itſelf a kind of tender to the plaintiff; by paying into the hands of the proper officer of the court as much as the defendant acknowledges to be due, together with the coſts hitherto incurred, in order to prevent the expence of any farther proceedings. This may be done upon what is called a *motion;* which is an occaſional application to the court by the parties or their counſel, in order to obtain ſome rule or order of court, which becomes neceſſary in the progreſs of a cauſe; and it is uſually grounded upon an *affidavit*, (the perfect tenſe of the verb *affido*), being a voluntary oath before ſome judge or officer of the court, to evince

vince the truth of certain facts, upon which the motion is grounded: though no ſuch affidavit is neceſſary for payment of money into court. If, after the money is paid in, the plaintiff proceeds in his ſuit, it is at his own peril: for if he does not prove more due than is ſo paid into court, he ſhall be nonſuited and pay the defendant's coſts; but he ſhall ſtill have the money ſo paid in, for that the defendant has acknowledged to be his due. To this head may alſo be referred the practice of what is called a *ſet off:* whereby the defendant acknowledges the juſtice of the plaintiff's demand on the one hand; but on the other, ſets up a demand of his own, to counterbalance that of the plaintiff, either in the whole or in part: as, if the plaintiff ſues for ten pounds due on a note of hand, the defendant may ſet off nine pounds due to himſelf for merchandize ſold to the plaintiff; and, in caſe he pleads ſuch ſet-off, muſt pay the remaining balance into court.

Pleas that totally deny the cauſe of complaint are either the general iſſue, or a ſpecial plea in bar.

1. The *general iſſue*, or general plea, is what traverſes, thwarts, and denies at once, the whole declaration, without offering any ſpecial matter whereby to evade it. As in treſpaſs either *vi et armis*, or on the caſe, "*non culpabilis*, not guilty;" in debt upon contract, "*nihil debet*, he owes nothing;" in debt on bond, "*non eſt factum*, it is not his deed;" on an *aſſumpſit*, "*non aſſumpſit*, he made no ſuch promiſe." Or in real actions, "*nul tort*, no wrong done; *nul diſſeiſin*, no diſſeiſin;" and in a writ of right, the miſe or iſſue is, that "the tenant has more right to hold than the demandant has to demand." Theſe pleas are called the *general iſſue*, becauſe, by importing an abſolute and general denial of what is alleged in the declaration, they amount at once to an iſſue; by which we mean a fact affirmed on one ſide and denied on the other.

2. *Special* pleas in bar of the plaintiff's demands are very various, according to the circumſtances of the defendant's caſe. As, in real actions, a general releaſe or a fine; both of which may deſtroy and bar the plaintiff's title. Or, in perſonal actions, an accord, arbitration, conditions performed, nonage of the defendant, or ſome other fact which precludes the plaintiff from his action. A *juſtification* is likewiſe a ſpecial plea in bar; as in actions of aſſault and battery, *ſon aſſault demeſne*, that it was the plaintiff's own original aſſault; in treſpaſs, that the defendant did the thing complained of in right of ſome office which warranted him ſo to do; or, in an action of ſlander, that the plaintiff is really as bad a man as the defendant ſaid he was.

Alſo a man may plead the ſtatutes of limitation in bar; or the time limited by certain acts of parliament, beyond which no plaintiff can lay his cauſe of action. This, by the ſtatute of 32 Hen. VIII. c. 2. in a writ of right is 60 years: in aſſiſes, writs of entry, or other poſſeſſory actions real, of the ſeiſin of one's anceſtors in lands; and either of their ſeiſin, or one's own, in rents, ſuits, and ſervices, 50 years: and in actions real for lands grounded upon one's own ſeiſin or poſſeſſion, ſuch poſſeſſion muſt have been within 30 years. By ſtatute 1 Mar. ſt. 2. c. 5. this limitation does not extend to any ſuit for avowſons. But by the ſtatute 21 Jac. I. c. 2. a time of limitation was extended to the caſe of the king; viz. 60 years precedent to 19th Feb. 1623: but, this becoming ineffectual by efflux of time, the ſame date of limitation was fixed by ſtatute 9 Geo. III. c. 16. to commence and be reckoned backwards, from the time of bringing any ſuit or other proceſs to recover the thing in queſtion; ſo that a poſſeſſion for 60 years is now a bar even againſt the prerogative, in derogation of the ancient maxim, *Nullum tempus occurrit regi.* By another ſtatute, 21 Jac. I. c. 16. 20 years is the time of limitation in any writ of formedon: and, by a conſequence, 20 years is alſo the limitation in every action of ejectment; for no ejectment can be brought, unleſs where the leſſor of the plaintiff is entitled to enter on the lands, and by the ſtatute 21 Jac. I. c. 16. no entry can be made by any man, unleſs within 20 years after his right ſhall accrue. Alſo all actions of treſpaſs (*quare clauſum fregit*, or otherwiſe) detinue, trover, replevin, account, and caſe, (except upon accounts between merchants), debt on ſimple contract, or for arrears of rent, are limited by the ſtatute laſt mentioned to ſix years after the cauſe of action commenced: and actions of aſſault, menace, battery, mayhem, and impriſonment, muſt be brought within four years, and actions for words two years, after the injury committed. And by the ſtatute 31 Eliz. c. 5. all ſuits, indictments, and informations, upon any penal ſtatutes, where any forfeiture is to the crown, ſhall be ſued within two years, and where the forfeiture is to a ſubject, within one year, after the offence committed, unleſs where any other time is ſpecially limited by the ſtatute. Laſtly, by ſtatute 10 W. III. c. 14. no writ of error, *ſcire facias*, or other ſuit, ſhall be brought to reverſe any judgment, fine, or recovery, for error, unleſs it be proſecuted within 20 years. The uſe of theſe ſtatutes of limitation is to preſerve the peace of the kingdom, and to prevent thoſe innumerable perjuries which might enſue if a man were allowed to bring an action for any injury committed at any diſtance of time. Upon both theſe accounts the law therefore holds, that *intereſt reipublicæ ut ſit finis litium:* and upon the ſame principle the Athenians laws in general prohibited all actions where the injury was committed five years before the complaint was made. If therefore, in any ſuit, the injury, or cauſe of action, happened earlier than the period expreſsly limited by law, the defendant may plead the ſtatutes of limitations in bar: as upon an *aſſumpſit*, or promiſe to pay money to the plaintiff, the defendant may plead, *Non aſſumpſit infra ſex annos*, He made no ſuch promiſe within ſix years; which is an effectual bar to the complaint.

An *eſtoppel* is likewiſe a ſpecial plea in bar; which happens where a man hath done ſome act, or executed ſome deed, which eſtops or precludes him from averring any thing to the contrary. As if a tenant for years (who hath no freehold) levies a fine to another perſon. Tho' this is void as to ſtrangers, yet it ſhall work as an eſtoppel to the cognizor; for, if he afterwards brings an action to recover theſe lands, and his fine is pleaded againſt him, he ſhall thereby be eſtopped from ſaying, that he had no freehold at the time, and therefore was incapable of levying it.

The conditions and qualities of a plea (which, as

Plea.

well as the doctrine of eſtoppels, will alſo hold equally, *mutatis mutandis*, with regard to other parts of pleading), are, 1. That it be ſingle and containing only one matter; for duplicity begets confuſion. But by ſtatute 4 & 5 Ann. c. 16. a man, with leave of the court, may plead two or more diſtinct matters or ſingle pleas; as in an action of aſſault and battery, theſe three, Not guilty, *ſon aſſault demeſne*, and the ſtatute of limitations. 2. That it be direct and poſitive, and not argumentative. 3. That it have convenient certainty of time, place, and perſons. 4. That it anſwer the plaintiff's allegations in every material point. 5. That it be ſo pleaded as to be capable of trial.

Special pleas are uſually in the affirmative, ſometimes in the negative, but they always advance ſome new fact not mentioned in the declaration; and then they muſt be averred to be true in the common form: —"And this he is ready to verify."—This is not neceſſary in pleas of the general iſſue, thoſe always containing a total denial of the facts before advanced by the other party, and therefore putting him upon the proof of them. See PLEADINGS.

Blackſt. Comment.

PLEA *to Indictment*, the defenſive matter alleged by a criminal on his indictment: (See ARRAIGNMENT.) This is either, 1. A plea to the juriſdiction; 2. A demurrer; 3. A plea in abatement; 4. A ſpecial plea in bar; or, 5. The general iſſue.

I. A plea to the *juriſdiction*, is where an indictment is taken before a court that hath no cognizance of the offence; as if a man be indicted for a rape at the ſheriff's tourn, or for treaſon at the quarter-ſeſſions: in theſe or ſimilar caſes, he may except to the juriſdiction of the court, without anſwering at all to the crime alleged.

II. A *demurrer* to the indictment, is incident to criminal caſes, as well as civil, when the fact as alleged is allowed to be true, but the priſoner joins iſſue upon ſome point of law in the indictment, by which he inſiſts, that the fact, as ſtated, is no felony, treaſon, or whatever the crime is alleged to be. Thus, for inſtance, if a man be indicted for feloniouſly ſtealing a gre-hound; which is an animal in which no valuable property can be had, and therefore it is not felony, but only a civil treſpaſs, to ſteal it; in this caſe the party indicted may demur to the indictment; denying it to be felony, though he confeſſes the act of taking it. Some have held, that if, on demurrer, the point of law be adjudged againſt the priſoner, he ſhall have judgment and execution, as if convicted by verdict. But this is denied by others, who hold, that in ſuch caſe he ſhall be directed and received to plead the general iſſue, Not guilty, after a demurrer determined againſt him. Which appears the more reaſonable, becauſe it is clear, that if the priſoner freely diſcovers the fact in court, and refers it to the opinion of the court whether it be felony or no; and upon the fact thus ſhewn, it appears to be felony, the court will not record the confeſſion, but admit him afterwards to plead not guilty. And this ſeems to be a caſe of the ſame nature, being for the moſt part a miſtake in point of law, and in the conduct of his pleading; and, though a man by miſpleading may in ſome caſes loſe his property, yet the law will not ſuffer him by ſuch niceties to loſe his life. However, upon this doubt, demurrers to indictments are ſeldom uſed: ſince the ſame advantages may be taken upon a plea of not guilty; or afterwards, in arreſt of judgment, when the verdict has eſtabliſhed the fact.

Plea

III. A plea in *abatement* is principally for a *miſnoſmer*, a wrong name, or a falſe addition to the priſoner. As, if James Allen, gentleman, is indicted by the name of *John Allen, eſquire*, he may plead that he has the name of *James*, and not of *John*; and that he is a *gentleman*, and not an *eſquire*. And, if either fact is found by a jury, then the indictment ſhall be abated, as writs or declarations may be in civil actions. But, in the end, there is little advantage accruing to the priſoner by means of theſe dilatory pleas; becauſe, if the exception be allowed, a new bill of indictment may be framed, according to what the priſoner in his plea avers to be his true name and addition. For it is a rule, upon all pleas in abatement, that he who takes advantage of a flaw, muſt at the ſame time ſhew how it may be amended. Let us therefore next conſider a more ſubſtantial kind of plea, *viz.*

IV. Special pleas in *bar*; which go to the merits of the indictment, and give a reaſon why the priſoner ought not to anſwer it at all, nor put himſelf upon his trial for the crime alleged. Theſe are of four kinds: a former acquittal, a former conviction, a former attainder, or a pardon. There are many other pleas which may be pleaded in bar of an appeal: but theſe are applicable to both appeals and indictments.

1. Firſt, the plea of *auterfoits acquit*, or a former acquittal, is grounded on this univerſal maxim of the common law of England, that no man is to be brought into jeopardy of his life, more than once, for the ſame offence. And hence it is allowed as a conſequence, that when a man is once fairly found not guilty upon any indictment, or other proſecution, before any court having competent juriſdiction of the offence, he may plead ſuch acquittal in bar of any ſubſequent accuſation for the ſame crime.

2. Secondly, the plea of *auterfoits convict*, or a former conviction for the ſame identical crime, though no judgment was ever given, or perhaps will be, (being ſuſpended by the benefit of clergy or other cauſes), is a good plea in bar to an indictment. And this depends upon the ſame principle as the former, that no man ought to be twice brought in danger of his life for one and the ſame crime.

3. Thirdly, the plea of *auterfoits attaint*, or a former attainder, is a good plea in bar, whether it be for the ſame or any other felony. For wherever a man is attainted of felony, by judgment of death either upon a verdict or confeſſion, by outlawry, or heretofore by abjuration, and whether upon an appeal or an indictment; he may plead ſuch attainder in bar to any ſubſequent indictment or appeal, for the ſame or for any other felony. And this becauſe, generally, ſuch proceeding on a ſecond proſecution cannot be to any purpoſe; for the priſoner is dead in law by the firſt attainder, his blood is already corrupted, and he hath forfeited all that he had: ſo that it is abſurd and ſuperfluous to endeavour to attaint him a ſecond time. Though to this general rule, as to all others, there are ſome exceptions; wherein, *ceſſante ratione, ceſſat et ipſa lex*.

4. Laſtly, a pardon may be pleaded in bar; as at once deſtroying the end and purpoſe of the indictment, by remitting that puniſhment, which the proſecution is calculated to inflict. There is one advantage that attends pleading a pardon in bar, or in arreſt of judgment, before ſentence is paſt; which gives it by much the preference to pleading it after ſentence or attainder. This is, that by ſtopping the judgment it ſtops the attainder, and prevents the corruption of the blood: which, when once corrupted by attainder, cannot afterwards be reſtored, otherwiſe than by act of parliament.

V. The *general iſſue*, or plea of not guilty, upon which plea alone the priſoner can receive his final judgment of death. In caſe of an indictment of felony or treaſon, there can be no ſpecial juſtification put in by way of plea. As, on an indictment for murder, a man cannot plead that it was in his own defence againſt a robber on the highway, or a burglar; but he muſt plead the general iſſue, Not guilty, and give this ſpecial matter in evidence. For (beſides that theſe pleas do in effect amount to the general iſſue; ſince, if true, the priſoner is moſt clearly not guilty) as the facts in treaſon are laid to be done *proditorie et contra ligeantiæ ſuæ debitum*; and, in felony, that the killing was done *felonice*; theſe charges, of a traiterous or felonious intent, are the points and very *giſt* of the indictment, and muſt be anſwered directly, by the general negative, Not guilty; and the jury upon the evidence will take notice of any defenſive matter, and give their verdict accordingly as effectually as in if it were or could be ſpecially pleaded. So that this is, upon all accounts, the moſt advantageous plea for the priſoner.

When the priſoner hath thus pleaded not guilty, *non culpabilis*, or *nient culpable*: which was formerly uſed to be abbreviated upon the minutes, thus, *Non* (or *nient*) *cul.* the clerk of the aſſiſe, or clerk of arraigns, on behalf of the crown replies, that the priſoner is guilty, and that he is ready to prove him ſo. This is done by two monoſyllables in the ſame ſpirit of abbreviation, *cul. prit.*: which ſignifies firſt that the priſoner is guilty, (*cul. culpable*, or *culpabilis*); and then that the king is ready to prove him ſo, (*prît*, *præſto ſum*, or *paratus*, *verificare*). By this replication the king and the priſoner are therefore at iſſue: for when the parties come to a fact which is affirmed on one ſide and denied on the other, then they are ſaid to be at iſſue in point of fact: which is evidently the caſe here, in the plea of *non cul.* by the priſoner; and the replication of *cul.* by the clerk.

How the courts came to expreſs a matter of this importance in ſo odd and obſcure a manner, can hardly be pronounced with certainty. It may perhaps, however, be accounted for by ſuppoſing, that theſe were at firſt ſhort notes, to help the memory of the clerk, and remind him what he was to reply; or elſe it was the ſhort method of taking down in court, upon the minutes, the replication and averment; *cul. prît*: which afterwards the ignorance of ſucceeding clerks adopted for the very words to be by them ſpoken (A).

But however it may have ariſen, the joining of iſſue ſeems to be clearly the meaning of this obſcure expreſſion; which has puzzled our moſt ingenious etymologiſts, and is commonly underſtood as if the clerk of the arraigns, immediately on plea pleaded, had fixed an opprobrious name on the priſoner, by aſking him, "*culprit*, how wilt thou be tried?" for immediately upon iſſue joined it is inquired of the priſoner, by what trial he will make his innocence appear. This form has at preſent reference to appeals and approvements only, wherein the appellee has his choice, either to try the accuſation by BATTLE or by JURY. But upon indictments, ſince the abolition of ORDEAL, there can be no other trial but by jury, *per pais*, or by the country: and therefore, if the priſoner refuſes to put himſelf upon the inqueſt in the uſual form, that is, to anſwer that he will be tried by God and the country, if a commoner; and, if a peer, by God and his peers; the indictment, if in treaſon, is taken *pro confeſſo*; and the priſoner, in caſes of felony, is judged to ſtand mute, and, if he perſeveres in his obſtinacy, ſhall now be convicted of the felony.

When the priſoner has thus pnt himſelf upon his trial, the clerk anſwers in the humane language of the law, which always hopes that the party's innocence rather than his guilt may appear, "God ſend thee a good deliverance." And then they proceed, as ſoon as conveniently may be, to the trial. See the article TRIAL.

PLEADINGS, in law, are the mutual altercations between the plaintiff and defendant, (ſee SUIT, WRIT, and PROCESS). They form the third part or ſtage of a fact; and at preſent are ſet down and delivered into the proper office in writing, though formerly they were uſually put in by their counſel *ore tenus*, or *viva voce*, in court, and then minuted down by the chief clerks or prothonotaries; whence, in our old law-French, the pleadings are frequently denominated the *parol*.

The firſt of theſe is the *declaration*, *narratio*, or *count*, anciently called the *tale*; in which the plaintiff ſets forth his cauſe of complaint at length: being indeed only an amplification or expoſition of the original writ upon which his action is founded, with the additional circumſtances of time and place, when and where, the injury was committed.

Blackſt. Comment.

In *local* actions, where poſſeſſion of land is to be recovered, or damages for an actual treſpaſs, or for waſte, &c. affecting land, the plaintiff muſt lay his declaration, or declare his injury to have happened in the very county and place that it really did happen; but in *tranſitory* actions, for injuries that might have happened any where, as debt, detinue, ſlander, and the like, the plaintiff may declare in what county he pleaſes, and then the trial muſt be in that county in which the declaration is laid. Though, if the defendant will make affidavit that the cauſe of action, if any, aroſe not in that but in another county, the court will direct a change of *the venue* or *viſne*, (that is, the *vicinia* or neighbourhood in which the injury is

---

(A) Of this ignorance we may ſee daily inſtances, in the abuſe of two legal terms of ancient French: one, the prologue to all proclamations, "*Oyez*, or Hear ye," which is generally pronounced, moſt unmeaningly, "O yes:" the other, a more pardonable miſtake, viz. when a jury are all ſworn, the officer bids the crier number them, for which the word in law-French is, "*Countez*;" but we now hear it pronounced in very good Engliſh, "Count theſe."

is declared to be done), and will oblige the plaintiff to declare in the proper county. For the ſtatute 6 Ric. II. c. 2. having ordered all writs to be laid in their proper counties, this, as the judges conceived, impowered them to change the *venue*, if required, and not to inſiſt rigidly on abating the writ: which practice began in the reign of James the firſt. And this power is diſcretionally exerciſed, ſo as not to cauſe but prevent a defect of juſtice. Therefore the court will not change the *venue* to any of the four northern counties, previous to the ſpring circuit; becauſe there the aſſiſes are holden only once a-year, at the time of ſummer circuit. And it will ſometimes remove the *venue* from the proper juriſdiction, (eſpecially of the narrow and limited kind), upon a ſuggeſtion, duly ſupported, that a fair and impartial trial cannot be had therein.

It is generally uſual, in actions upon the caſe, to ſet forth ſeveral caſes, by different counts in the ſame declaration; ſo that if the plaintiff fails in the proof of one, he may ſucceed in another. As in an action on the caſe upon an ASSUMPSIT for goods ſold and delivered, the plaintiff uſually counts or declares, firſt, upon a ſettled and agreed price between him and the defendant; as, that they bargained for 20 l.: and leſt he ſhould fail in the proof of this, he counts likewiſe upon a *quantum valebant;* that the defendant bought other goods, and agreed to pay him ſo much as they were reaſonably worth: and then avers, that they were worth other 20l. and ſo on in three or four different ſhapes; and at laſt concludes with declaring, that the defendant had refuſed to fulfil any of theſe agreements, whereby he is endamaged to ſuch a value. And if he proves the caſe laid in any one of his counts, though he fails in the reſt, he ſhall recover proportionable damages. This declaration always concludes with theſe words, "and thereupon he brings ſuit," &c. *inde producit ſectam, &c.* By which words, *ſuit* or *ſecta*, (*a ſequendo*), were anciently underſtood the witneſſes or followers of the plaintiff. For in former times, the law would not put the defendant to the trouble of anſwering the charge till the plaintiff had made out at leaſt a probable caſe. But the actual production of the *ſuit*, *ſecta*, or *followers*, is now antiquated, and hath been totally diſuſed, at leaſt ever ſince the reign of Edward III. though the form of it ſtill continues.

At the end of the declaration are added alſo the plaintiff's common pledges of proſecution, John Doe and Richard Roe; which, as we elſewhere obſerved, (ſee WRIT), are now mere names of form; though formerly they were of uſe to anſwer to the king for the amercement of the plaintiff, in caſe he were nonſuited, barred of his action, or had a verdict and judgment againſt him. For if the plaintiff neglects to deliver a declaration for two terms after the defendant appears, or is guilty of other delays or defaults againſt the rules of law in any ſubſequent ſtage of the action, he is adjudged not to follow or purſue his remedy as he ought to do; and thereupon a *non-ſuit*, or *non proſequitur*, is entered, and he is ſaid to be *non-proſ'd*. And for thus deſerting his complaint, after making a falſe claim or complaint, (*pro falſo clamore ſuo*), he ſhall not only pay coſts to the defendant, but is liable to be amerced to the king. A *retraxit* differs from a non-ſuit, in that the one is negative and the other poſitive: the non-ſuit is a default and neglect of the plaintiff, and therefore he is allowed to begin his ſuit again upon payment of coſts; but a *retraxit* is an open and voluntary renunciation of his ſuit in court; and by this he for ever loſes his action. A *diſ-continuance* is ſomewhat ſimilar to a non-ſuit; for when a plaintiff leaves a chaſm in the proceedings of his cauſe, as by not continuing the proceſs regularly from day to day, and time to time, as he ought to do, the ſuit is diſcontinued, and the defendant is no longer bound to attend; but the plaintiff muſt begin again, by ſuing out a new original, uſually paying coſts to his antagoniſt.

When the plaintiff hath ſtated his caſe in the declaration, it is incumbent on the defendant, within a reaſonable time, to make his defence, and to put in a plea; or elſe the plaintiff will at once recover judgment by *default*, or *nihil dicit*, of the defendant.

Defence, in its true legal ſenſe, ſignifies not a juſtification, protection, or guard, which is now its popular ſignification; but merely an *oppoſing* or *denial* (from the French verb *defender*) of the truth or validity of the complaint. It is the *conteſtatio litis* of the civilians: a general aſſertion that the plaintiff hath no ground of action; which aſſertion is afterwards extended and maintained in his plea.

Before defence made, if at all, cognizance of the ſuit muſt be claimed or demanded; when any perſon or body-corporate hath the franchiſe, not only of holding pleas within a particular limited juriſdiction, but alſo of the cognizance of pleas; and that either without any words excluſive of other courts, which entitles the lord of the franchiſe, whenever any ſuit that belongs to his juriſdiction is commenced in the courts at Weſtminſter, to demand the cognizance thereof; or with ſuch excluſive words, which alſo entitle the defendant to plead to the juriſdiction of the court. Upon this claim of cognizance, if allowed, all proceedings ſhall ceaſe in the ſuperior court, and the plaintiff is left at liberty to purſue his remedy in the ſpecial juriſdiction. As, when a ſcholar or other privileged perſon of the univerſities of Oxford or Cambridge is impleaded in the courts at Weſtminſter, for any cauſe of action whatſoever, unleſs upon a queſtion of freehold. In theſe caſes, by the charter of thoſe learned bodies, confirmed by act of parliament, the chancellor, or vice-chancellor, may put in a claim of cognizance; which, if made in due time and form, and with due proof of the facts alleged, is regularly allowed by the courts. It muſt be demanded before full defence is made or imparlance prayed; for theſe are a ſubmiſſion to the juriſdiction of the ſuperior court, and the delay is a *laches* in the lord of the franchiſe: and it will not be allowed if it occaſions a failure of juſtice, or if an action be brought againſt the perſon himſelf who claims the franchiſe, unleſs he hath alſo a power in ſuch caſe of making another judge.

After defence made, the defendant muſt put in his plea. But before he defends, if the ſuit is commenced by *capias* or *latitat*, without any ſpecial original, he is entitled to demand one *imparlance*, or *licentia loquendi;* and may, before he pleads, have more granted by conſent of the court, to ſee if he can end the matter amicably without farther ſuit, by talking with the plaintiff: a practice which is ſuppoſed to have ariſen from a principle of religion, in obedience to that precept of the goſpel, "agree with thine adverſary quickly, whilſt thou art *in the way* with him." And it may be obſerved, that this goſpel-precept has a plain reference to the Roman law of the twelve tables, which expreſsly directed the plaintiff and defendant to make up the matter, while they were in the way, or going to the prætor;—*in via, rem uti pacunt orato.* There are alſo many other previous ſteps which may be taken by a defendant before he puts in his plea. He may, in real actions, demand a view of the thing in queſtion, in order to aſcertain its identity and other circumſtances. He may crave *oyer* of the writ, or of the bond, or other ſpecialty upon which the action is brought; that is, to hear it read to him; the generality of defendants in the times of ancient ſimplicity being ſuppoſed incapable to read it themſelves: whereupon the whole is entered *verbatim* upon the record; and the defendant may take advantage of any condition, or other part of it, not ſtated in the plaintiff's declaration. In real actions alſo the tenant may pray in *aid*, or call for aſſiſtance of another, to help him to plead, becauſe of the feebleneſs or imbecillity of his own eſtate. Thus a tenant for life may pray in aid of him that hath the inheritance in remainder or reverſion; and an incumbent may pray in aid of the patron and ordinary; that is, that they ſhall be joined in the action, and help to defend the title. *Voucher* alſo is the calling in of ſome perſon to anſwer the action, that hath warranted the title to the tenant or defendant. This we ſtill make uſe of in the form of common recoveries, which are grounded on a writ of entry; a ſpecies of action that relies chiefly on the weakneſs of the tenant's title, who therefore vouches another perſon to warrant it. If the vouchee appears, he is made defendant inſtead of the vouchor; but if he afterwards makes default, recovery ſhall be had againſt the original defendant; and he ſhall recover an equivalent in value againſt the deficient vouchee. In aſſizes, indeed, where the principal queſtion is, whether the demandant or his anceſtors were or were not in poſſeſſion till the ouſter happened, and the title of the tenant is little (if at all) diſcuſſed, there no voucher is allowed; but the tenant may bring a writ of *warrantia chartæ* againſt the warrantor, to compel him to aſſiſt him with a good plea or defence, or elſe to render damages and the value of the land, if recovered againſt the tenant. In many real actions alſo, brought by or againſt an infant under the age of 21 years, and alſo in actions of debt brought againſt him, as heir to any deceaſed anceſtor, either party may ſuggeſt the nonage of the infant, and pray that the proceedings may be deferred till his full age, or, in our legal phraſe, that the infant may have his age, and that the *parol may demur*, that is, that the pleadings may be ſtaid; and then they ſhall not proceed till his full age, unleſs it be apparent that he cannot be prejudiced thereby. But by the ſtatutes of Weſtm. 1. 3 Edw. I. c. 46. and of Gloceſter, 6 Edw. I. c. 2. in writs of entry *ſur diſſeiſin* in ſome particular caſes, and in actions aunceſtrel brought by an infant, the parol ſhall not demur; otherwiſe he might be deforced of his whole property, and even want a maintenance, till he came of age. So likewiſe in a writ of dower the heir ſhall not have his age; for it is neceſſary that the widow's claim be immediately determined, elſe ſhe may want a preſent ſubſiſtence. Nor ſhall an infant patron have it in a *quare impedit*, ſince the law holds it neceſſary and expedient, that the church be immediately filled.

When theſe proceedings are over, the defendant muſt then put in his excuſe or plea. See Plea.

It is a rule in pleading, that no man be allowed to plead ſpecially ſuch a plea as amounts only to the general iſſue, or a total denial of the charge; but in ſuch caſe he ſhall be driven to plead the general iſſue in terms, whereby the whole queſtion is referred to a jury. But if the defendant, in an aſſize or action of treſpaſs, be deſirous to refer the validity of his title to the court rather than the jury, he may ſtate his title ſpecially, and at the ſame time give colour to the plaintiff, or ſuppoſe him to have an appearance or colour of title, bad indeed in point of law, but of which the jury are not competent judges. As if his own true title is, that he claims by feoffment with livery from A, by force of which he entered on the lands in queſtion, he cannot plead this by itſelf, as it amounts to no more than the general iſſue, *nul tort, nul diſſeiſin*, in aſſize, or *not guilty* in an action of treſpaſs. But he may allege this ſpecially, provided he goes farther, and ſays, that the plaintiff claiming by colour of a prior deed of feoffment, without livery, entered; upon whom he entered; and may then refer himſelf to the judgment of the court which of theſe two titles is the beſt in point of law.

When the plea of the defendant is thus put in, if it does not amount to an iſſue or total contradiction of the declaration, but only evades it, the plaintiff may plead again, and reply to the defendant's plea: Either traverſing it, that is, totally denying it; as if, on an action of debt upon bond, the defendant pleads *ſolvit ad diem*, that he paid the money when due; here the plaintiff in his replication may totally traverſe this plea, by denying that the defendant paid it: Or he may allege new matter in contradiction to the defendant's plea; as when the defendant pleads no award made, the plaintiff may reply, and ſet forth an actual award, and aſſign a breach: Or the replication may confeſs and avoid the plea, by ſome new matter or diſtinction, conſiſtent with the plaintiff's former declaration; as in an action for treſpaſſing upon land whereof the plaintiff is ſeized, if the defendant ſhews a title to the land by deſcent, and that therefore he had a right to enter, and gives colour to the plaintiff, the plaintiff may either traverſe and totally deny the fact of the deſcent; or he may confeſs and avoid it, by replying, that true it is that ſuch deſcent happened, but that ſince the deſcent the defendant himſelf demiſed the lands to the plaintiff for term of life. To the replication the defendant may *rejoin*, or put in an anſwer called a *rejoinder*. The plaintiff may anſwer the rejoinder by a *ſur-rejoinder;* upon which the defendant may *rebut*, and the plaintiff anſwer him by a *ſur-rebutter*. Which pleas, replications, rejoinders, ſur-rejoinders, rebutters, and ſur-rebutters anſwer to the *exceptio, replicatio, duplicatio, triplicatio*, and *quadruplicatio*, of the Roman laws.

The whole of this proceſs is denominated the *pleading;* in the ſeveral ſtages of which it muſt be carefully ob-

obſerved, not to depart or vary from the title or defence which the party has once inſiſted on. For this (which is called a *departure* in pleading) might occaſion endleſs altercation. Therefore the replication muſt ſupport the declaration, and the rejoinder muſt ſupport the plea, without departing out of it. As in the caſe of pleading no award made in conſequence of a bond of arbitration, to which the plaintiff replies, ſetting forth an actual award; now the defendent cannot rejoin that he hath performed this award, for ſuch rejoinder would be an entire departure for his original plea, which alleged that no ſuch award was made: therefore he has now no other choice, but to traverſe the fact of the replication, or elſe to demur upon the law of it.

Again, all duplicity in pleading muſt be avoided. Every plea muſt be ſimple, entire, connected, and confirmed to one ſingle point: it muſt never be entangled with a variety of diſtinct independent anſwers to the ſame matter; which muſt require as many different replies, and introduce a multitude of iſſues upon one and the ſame diſpute. For this would often embarraſs the jury, and ſometimes the court itſelf, and at all events would greatly enhance the expence of the parties. Yet it frequently is expedient to plead in ſuch a manner as to avoid any implied admiſſion of a fact, which cannot with propriety or ſafety be poſitively affirmed or denied. And this may be done by what is called a *proteſtation;* whereby the party interpoſes an oblique allegation or denial of ſome fact, proteſting (by the gerund, *proteſtando*) that ſuch a matter does or does not exiſt; and at the ſame time avoiding a direct affirmation or denial. Sir Edward Coke hath defined a proteſtation (in the pithy dialect of that age) to be "an excluſion of a concluſion." For the uſe of it is, to ſave the party from being concluded with reſpect to ſome fact or circumſtance which cannot be directly affirmed or denied without falling into duplicity of pleading; and which yet, if he did not thus enter his proteſt, he might be deemed to have tacitly waved or admitted. Thus, while tenure in villenage ſubſiſted, if a villein had brought an action againſt his lord, and the lord was inclined to try the merits of the demand, and at the ſame time to prevent any concluſion againſt himſelf that he had waved his ſigniory; he could not in this caſe both plead affirmatively that the plaintiff was his villein, and alſo take iſſue upon the demand; for then his plea would have been double, as the former alone would have been a good bar to the action: but he might have alleged the villenage of the plaintiff by way of proteſtation, and then have denied the demand. By this means the future vaſſalage of the plaintiff was ſaved to the defendant, in caſe the iſſue was found in his (the defendant's) favour; for the proteſtation prevented that concluſion which would otherwiſe have reſulted from the reſt of his defence, that he had enfranchiſed the plaintiff, ſince no villein could maintain a civil action againſt his lord. So alſo if a defendant, by way of inducement to the point of his defence, alleges (among other matters) a particular mode of ſeiſin or tenure which the plaintiff is unwilling to admit, and yet deſires to take iſſue on the principal point of the defence, he muſt deny the ſeiſin or tenure by way of proteſtation, and then traverſe the defenſive matter. So, laſtly, if an award be ſet forth by the plaintiff, and he can aſſign a breach in one part of it (viz. the non-payment of a ſum of money) and yet is afraid to admit the performance of the reſt of the award, or to aver in general a non-performance of any part of it, leſt ſomething ſhould appear to have been performed; he may ſave to himſelf any advantage he might hereafter make of the general non-performance, by alleging that by proteſtation, and plead only the non-payment of the money.

In any ſtage of the pleadings, when either ſide advances or affirms any new matter, he uſually (as was ſaid) avers it to be true; "and this he is ready to verify." On the other hand, when either ſide traverſes or denies the facts pleaded by his antagoniſt, he uſually tenders an *iſſue*, as it is called; the language of which is different according to the party by whom it is tendered: for if the traverſe or denial comes from the defendant, the iſſue is tendered in this manner, "And of this he puts himſelf upon the country," thereby ſubmitting himſelf to the judgment of his peers: but if the traverſe lies upon the plaintiff, he tenders the iſſue or prays the judgment of the peers againſt the defendant in another form; thus, "And this he prays may be inquired of by the country."

But if either ſide (as, for inſtance, the defendant) pleads a ſpecial negative plea, not traverſing or denying any thing that was before alleged, but diſcloſing ſome new negative matter; as where the ſuit is on a bond conditioned to perform an award, and the defendant pleads, negatively, that no award was made; he tenders no iſſue upon this plea, becauſe it does not yet appear whether the fact will be diſputed, the plaintiff not having yet aſſerted the exiſtence of any award: but when the plaintiff replies, and ſets forth an actual ſpecific award, if then the defendant traverſes the replication, and denies the making of any ſuch award, he then, and not before, tenders an iſſue to the plaintiff. For when, in the courſe of pleading, they come to a point which is affirmed on one ſide and denied on the other, they are then ſaid to be at iſſue; all their debates being at laſt contracted into a ſingle point, which muſt now be determined either in favour of the plaintiff or of the defendant. See the article ISSUE, in the APPENDIX.

PLEASURE *and* **PAIN**, ſays Mr Locke, are ſimple ideas which we receive both from ſenſation and reflection; theſe being thoughts of the mind, as well as ſenſations accompanied with pleaſure and pain. See METAPHYSICS, n° 71, 72.

PLEBEIAN, any perſon of the rank of the common people. It is chiefly uſed in ſpeaking of the ancient Romans, who were divided into ſenators, patricians, and plebeians. The diſtinction was made by Romulus the founder of the city; who confined all dignities, civil, military, and ſacerdotal, to the rank of patricians. But, to prevent the ſeditions which ſuch a diſtinction might produce through the pride of the higher order and the envy of the lower, he endeavoured to engage them to one another by reciprocal ties and obligations. Every plebeian was allowed to chooſe, out of the body of the partricians, a protector, who ſhould be obliged to aſſiſt him with his intereſt and ſubſtance, and to defend him from oppreſſion. Theſe protectors were called *patrons;* the protected, *clients.* It was the duty of the patron to draw up the contracts of the clients, to extricate them out of their difficulties and perplexities, and to guard their ignorance againſt the artfulneſs of the crafty. On the other hand, if the patron was poor, his clients were obliged to contribute to the portions of his daughters, the payment of his debts, and the ranſom of him and his children if they happened to be taken in war. The client and patron could neither accuſe, nor bear witneſs againſt each other; and if either of them was convicted of having violated this law, the crime was equal to that of treaſon, and any one might with impunity ſlay the offender as a victim devoted to Pluto and the infernal gods. For more than 600 years, we find no diſſenſions nor jealouſies between the patrons and their clients; not even in the times of the republic, when the people frequently mutinied againſt the great and powerful.

PLEDGE, (*Plegius*), in common law, a ſurety, or gage, either real or perſonal, which the plaintiff or demandant is to find for his proſecuting the ſuit.

The word is ſometimes alſo uſed for Frank *Pledge*, which ſee.

To Pledge, in drinking, denotes to warrant, or be ſurety to one, that he ſhall receive no harm while he is taking his draught.—The phraſe is referred by our antiquaries, to the practice of the Danes, heretofore in England, who frequently uſed to ſtab, or cut the throats of the natives, while they were drinking.

PLEDGERY, or Pleggery, in law, ſuretiſhip, or an undertaking or anſwering for another.

Pledges *of Goods* for money. See Pawn, in the APPENDIX.

PLEDGET, Bolster, or *Compreſs*, in ſurgery, a kind of flat tent laid over a wound, to imbibe the ſuperfluous humours, and to keep it clean.

PLEIADES, in fabulous hiſtory, the ſeven daughters of Atlas king of Mauritania, and Pleione, were thus called from their mother. They were Maia, Electra, Taygete, Aſterope, Merope, Halcyone, and Celœno: and were alſo called *Atlantides*, from their father Atlas. Theſe princeſſes were carried off by Buſiris, king of Egypt; but Hercules having conquered him, delivered them to their father: yet they afterwards ſuffered a new perſecution from Orion, who purſued them five years, till Jove, being prevailed on by their prayers, took them up into the heavens, where they form the conſtellation which bears their name.

Pleiades, in aſtronomy, an aſſemblage of ſeven ſtars, in the neck of the conſtellation Taurus.

They are thus called from the Greek πλειν, *navigare*, "to ſail;" as being terrible to mariners, by reaſon of the rains and ſtorms that frequently riſe with them. The Latins called them *vergiliæ*, from *ver*, "ſpring;" becauſe of their riſing about the time of the vernal equinox. The largeſt is of the third magnitude, and is called *lucidæ pleiadum.*

PLENARY, ſomething complete or full. Thus we ſay the pope grants *plenary* indulgences; *i. e.* full and entire remiſſions of the penalties due to all ſins. See Indulgence.

PLENIPOTENTIARY, a perſon veſted with full power to do any thing. See Ambassador.

PLENITUDE, the quality of a thing that is full, or that fills another. In medicine, it chiefly denotes a redundancy of blood and humours.

PLENUM, in phyſics, denotes, according to the Carteſians, that ſtate of things wherein every part of ſpace is ſuppoſed to be full of matter, in oppoſition to a vacuum.

PLENUS flos, a full flower; a term expreſſive of the higheſt degree of luxuriance in flowers. The petals in full flowers are ſo multiplied as to exclude all the ſtamina, and frequently to choak up the female organ; ſo that ſuch flowers, although the moſt delightful to the eye, are both vegetable monſters, and, according to the ſexualiſts, vegetable eunuchs; the unnatural increaſe of the petals conſtituting the firſt; the conſequent excluſion of the ſtamina or male organs, the latter.

Flowers with more petals than one, are moſt liable to this, as well as the inferior degrees of luxuriance. The following are well known examples; ranunculus, anemone, marſh-marygold, columbine, fennel-flower, poppy, pæony, pink, gilliflower, campion, viſcous campion, lily, crown imperial, tulip, narciſſus, rocket, mallow, Syrian mallow, apple, pear, peach, cherry, almond, myrtle, roſe, and ſtrawberry.

Flowers with one petal, are more rarely ſubject to fullneſs; that they are not, however, totally exempted, appears from polianthus, hyacinth, primroſe, crocus, meadow-ſaffron, and thorn-apple, tho' Kramer has aſſerted that a full flower with one petal is a contradiction in terms.

In flowers with one petal, the mode of luxuriance, or impletion, is by a multiplication of the diviſions of the limb or upper part; in flowers with more petals than one, by a multiplication of the petals or nectarium.

To take a few examples. Columbine is rendered full in three different ways: 1. By the multiplication of its petals, and total excluſion of the nectaria; 2. By the multiplication of the nectaria, and excluſion of the petals; or, 3. By ſuch an increaſe of the nectaria only as does not exclude the petals, between each of which are interjected three nectaria, placed one within another. Again, fennel-flower is rendered full, by an increaſe of the nectaria only; narciſſus, either by a multiplication of its cup and petals, or of its cup only; lark-ſpur, commonly by an increaſe of the petals, and excluſion of the ſpur, which is its nectarium. In *ſaponaria concava anglica*, the impletion is attended with the ſingular effect of incorporating the petals, and reducing their number from five to one; and in gelder roſe, the luxuriance is effected by an increaſe both in magnitude and number of the plain, wheel-ſhaped, barren florets of the circumference or margin of the head of flowers; and an excluſion of all the bell-ſhaped hermaphrodite florets of the centre or diſk.

Hitherto we have treated of plenitude in ſimple flowers only: the inſtance juſt now adduced ſeems to connect the different modes of impletion in them and compound flowers. Before proceeding further, however, it will not be improper to premiſe, that as a ſimple luxuriant flower is frequently, by beginners, miſtaken for a compound flower in a natural ſtate, ſuch flowers may always be diſtinguiſhed with certainty by this rule: That in ſimple flowers, however luxuriant, there is but one *piſtillum*, or female organ; whereas in compound flowers, each floret, or partial flower, is furniſhed with its own proper *piſtillum*. Thus in hawkweed, a compound flower, each flat or tongue-ſhaped floret in the agregate has its five ſtamina and naked ſeed; which laſt is, in effect, its *piſtillum*; whereas, in a luxuriant lychnis, which is a ſimple flower, there is found only one piſtillum, or female organ, common to the whole.

In a compound radiated flower, which generally conſiſts of plain florets in the margin or radius, and tubular or hollow florets in the centre or diſc; plenitude is effected either by an increaſe of the florets in the margin, and a total excluſion of thoſe in the diſc; which mode of luxuriance is termed *impletion by the radius*, and reſembles what happens in the gelder-roſe: or by an elongation of the hollow florets in the centre, and a leſs profound diviſion of their brims; which is termed *impletion by the diſc*. In the firſt mode of luxuriance, the florets in the centre, which are always hermaphrodite or male, are entirely excluded; and in their place ſucceed florets ſimilar in ſex to thoſe of the radius. Now, as the florets in the margin of a radiated compound flower, are found to be always either female, that is, furniſhed with the piſtillum only; or neuter, that is, furniſhed with neither ſtamina nor piſtillum; it is evident, that a radiated compound flower, filled by the radius, will either be entirely female, as in feverfew, daiſy, and African marygold; or entirely neuter, as in ſun-flower, marygold, and centaury: hence it will always be eaſy to diſtinguiſh ſuch a luxuriant flower from a compound flower with plain florets in a natural ſtate; as theſe florets are all hermaphrodite; that is, furniſhed with both ſtamina and piſtillum. Thus the full flowers of African marygold have each floret furniſhed with the piſtillum or female organ only: the natural flowers of dandelion, which, like the former, is compoſed of plain florets, are furniſhed with both ſtamina and piſtillum.

In the ſecond mode of luxuriance, termed *impletion by the diſc*, the florets in the margin ſometimes remain unchanged; but moſt commonly adopt the figure of thoſe in the centre, without, however, ſuffering any alteration in point of ſex; ſo that confuſion is leſs to be apprehended from this mode of luxuriance than from the former; beſides, the length to which the florets in the centre run out is of itſelf a ſufficient diſtinction, and adapted to excite at once an idea of luxuriance. Daiſy, feverfew, and African marygold, exhibit inſtances of this as well as of the former mode of impletion.

In luxuriant compound flowers with plain florets, the *ſemifloſculoſi* of Tournefort, the ſtigma or ſummit of the ſtyle in each floret is lengthened, and the ſeed-buds are enlarged and diverge; by which characters ſuch flowers may always be diſtinguiſhed from flowers of the ſame kind in a natural ſtate. Scorzonera, nipplewort, and goat's-beard, furniſh frequent inſtances of the plenitude alluded to.

Laſtly, the impletion of compound flowers with tubular or hollow florets, the floſculoſi of Tournefort, ſeems to obſerve the ſame rules as that of radiated flowers juſt delivered. In everlaſting-flower, the *xeranthemum* of Linnæus, the impletion is ſingular, being effected by the enlargement and expanſion of the inward chaffy ſcales of the calix. Theſe ſcales, which become coloured, are greatly augmented in length, ſo as to overtop the florets, which are ſcarce larger than thoſe of the ſame flower in a natural ſtate. The florets too in the margin, which in the natural flower are female, become, by luxuriance, barren; that is, are deprived of the piſtillum; the ſtyle, which was very ſhort, ſpreads, and is of the length of the chaffy ſcales; and its ſummits, formerly two in number, are metamorphoſed into one.

Full flowers are more eaſily referred to their reſpective genera in methods founded upon the calix, as the flower-cup generally remains unaffected by this higheſt degree of luxuriance.

PLEONASM, a figure in rhetoric, whereby we uſe words ſeemingly ſuperfluous, in order to expreſs a thought with the greater energy; ſuch as, "I ſaw it with my own eyes," &c. See ORATORY, nº 64.

PLETHORA, in medicine, from πληθος, "plenitude." A plethora is when the veſſels are too much loaded with fluids. The plethora may be ſanguine or ſerous. In the firſt there is too much craſſamentum in the blood, in the latter too little. In a ſanguine plethora there is danger of a fever, inflammation, apoplexy, rupture of the blood-veſſels, obſtricted ſecretions, &c.: In a ſerous, a dropſy, &c. A rarefaction of the blood produces all the effects of a plethora; it may accompany a plethora, and ſhould be diſtinguiſhed therefrom. Mr Bromfield obſerves, that a ſanguine plethora may thus be known to be preſent by the pulſe. An artery overcharged with blood is as incapable of producing a ſtrong full pulſe, as one that contains a deficient quantity; in both caſes, there will be a low and weak pulſe. To diſtinguiſh rightly, the pulſe muſt not be felt with one or two fingers on the carpal artery; but if three or four fingers cover a conſiderable length of the artery, and we preſs hard for ſome time on it, and then ſuddenly raiſe all theſe fingers except that which is neareſt to the patient's hand, the influx of the blood, if there is a plethora, will be ſo rapid as to raiſe the other finger, and make us ſenſible of the fulneſs. The ſanguine plethora is relieved by bleeding; the ſerous by purging, diuretics, and ſweating.

PLEURA, in anatomy, a thin membrane covering the inſide of the thorax. See ANATOMY, nº 377.

PLEURONECTES, in ichthyology, a genus belonging to the order of thoracici. Both eyes are on the ſame ſide of the head; there are from four to five rays in the gill-membrane; the body is compreſſed; the one ſide reſembling the back, the other the belly. There are 17 ſpecies; the moſt remarkable are,

1. The hippogloſſus, or holibut. This is the largeſt of the genus: ſome have been taken in our ſeas weighing from 100 to 300 pounds; but much larger are found in thoſe of Newfoundland, Greenland, and Iceland, where they are taken with a hook and line in very deep water. They are part of the food of the Greenlanders, who cut them into large ſlips, and dry them in the ſun. They are common in the London markets, where they are expoſed to ſale cut into large pieces. They are very coarſe eating, excepting the part which adheres to the ſide-fins, which is extremely fat and delicious, but ſurfeiting. They are the moſt voracious of all flat fiſh. There have been inſtances of their ſwallowing the lead weight at the end of a line, with which the ſeamen were ſounding the bottom

tom from on board a ſhip. The holibut, in reſpect to its length, is the narroweſt of any of this genus except the ſole. It is perfectly ſmooth, and free from ſpines either above or below. The colour of the upper part is duſky; beneath, of a pure white. We do not count the rays of the fins in this genus; not only becauſe they are ſo numerous, but becauſe nature hath given to each ſpecies characters ſufficient to diſtinguiſh them by. Theſe flat fiſh ſwim ſideways; for which reaſon Linnæus hath ſtyled them *pleuronectes*.

2. The plateſſa, or plaiſe, are very common on moſt of our coaſts, and ſometimes taken of the weight of 15 pounds; but they ſeldom reach that ſize, one of eight or nine pounds being reckoned a large fiſh. The beſt and largeſt are taken off Rye on the coaſt of Suſſex, and alſo off the Dutch coaſts. They ſpawn in the beginning of February. They are very flat, and much more ſquare than the preceding. Behind the left eye is a row of ſix tubercles, that reaches to the commencement of the lateral line. The upper part of the body and fins is of a clear brown, marked with large bright orange-coloured ſpots: the belly is white.

3. The fleſus, or flounder, inhabits every part of of the Britiſh ſea, and even frequents our rivers at a great diſtance from the ſalt waters; and for this reaſon ſome writers call it the *paſſer fluviatilis*. It never grows large in our rivers, but is reckoned ſweeter than thoſe that live in the ſea. It is inferior in ſize to the plaiſe, ſeldom or never weighing more than ſix pounds. It may very eaſily be diſtinguiſhed from the plaiſe, or any other fiſh of this genus, by a row of ſharp ſmall ſpines that ſurround its upper ſides, and are placed juſt at the junction of the fins with the body. Another row marks the ſide-line, and runs half way down the back. The colour of the upper part of the body is a pale brown, ſometimes marked with a few obſcure ſpots of dirty yellow: the belly is white.

4. The limanda, or dab, is found with the other ſpecies, but is leſs common. It is in beſt ſeaſon during February, March, and April: they ſpawn in May and June, and become flabby and watery the reſt of ſummer. They are ſuperior in goodneſs to the plaiſe and flounder, but far inferior in ſize. It is generally of an uniform brown colour on the upper ſide, though ſometimes clouded with a darker. The ſcales are ſmall and rough, which is a character of this ſpecies. The lateral line is extremely incurvated at the beginning, then goes quite ſtraight to the tail. The lower part of the body is white.

5. The ſolea, or ſole, is found on all our coaſts; but thoſe on the weſtern ſhores are much ſuperior in ſize to thoſe of the north. On the former they are ſometimes taken of the weight of ſix or ſeven pounds, but towards Scarborough they rarely exceed one pound; if they reach two, it is extremely uncommon. They are uſually taken in the trawl-net: they keep much at the bottom, and feed on ſmall ſhell-fiſh. It is of a form much more narrow and oblong than any other of the genus. The irides are yellow; the pupils of a bright ſapphirine colour: the ſcales are ſmall, and very rough: the upper part of the body is of a deep brown; the tip of one of the pectoral fins, black; the under part of the body, white: the lateral line is ſtraight; the tail rounded at the end. It is a fiſh of a very delicate flavour; but the ſmall ſoles are much ſuperior in goodneſs to large ones. By the ancient laws of the Cinque Ports, no one was to take ſoles from the 1ſt of November to the 15th of March; neither was any body to fiſh from ſun-ſetting to ſun-riſing, that the fiſh might enjoy their night-food. The chief fiſhery for them is at Brixham in Torbay.

6. The maximus, or turbot, grows to a very large ſize; Mr Pennant has ſeen them of 23 pounds weight, but has heard of ſome that weighed 30. They are taken chiefly off the north coaſt of England, and others off the Dutch coaſt.

The large turbots, and ſeveral other kinds of flat fiſh, are taken by the hook and line, for they lie in deep water: the method of taking them in wares, or ſtaked nets, is too precarious to be depended on for the ſupply of our great markets, becauſe it is by mere accident that the great fiſh ſtray into them. The following is the method of fiſhing for turbot followed at Scarborough: When they go out to fiſh, each perſon is provided with three lines. Each man's lines are fairly coiled upon a flat oblong piece of wicker-work; the hooks being baited, and placed very regularly in the centre of the coil. Each line is furniſhed with 14 ſcore of hooks, at the diſtance of ſix feet two inches from each other. The hooks are faſtened to the lines upon ſneads of twiſted horſe-hair, 27 inches in length. When fiſhing, there are always three men in each coble; and conſequently nine of theſe lines are faſtened together, and uſed as one line, extending in length near three miles, and furniſhed with 2520 hooks. An anchor and a buoy are fixed at the firſt end of the line, and one more of each at the end of each man's lines; in all four anchors, which are commonly perforated ſtones, and four buoys made of leather or cork. The line is always laid acroſs the current. The tides of flood and ebb continue an equal time upon our coaſt; and, when undiſturbed by winds, run each way about ſix hours. They are ſo rapid, that the fiſhermen can only ſhoot and haul their lines at the turn of tide; and therefore the lines always remain upon the ground about ſix hours. The ſame rapidity of tide prevents their uſing hand-lines; and therefore two of the people commonly wrap themſelves in the ſail, and ſleep, while the other keeps a ſtrict look-out, for fear of being run down by ſhips, and to obſerve the weather. For ſtorms often riſe ſo ſuddenly, that it is with extreme difficulty they can ſometimes eſcape to the ſhore, leaving their lines behind. The coble is 20 feet 6 inches long, and 5 feet extreme breadth. It is about one ton burden, rowed with three pair of ores, and admirably conſtructed for the purpoſe of encountering a mountainous ſea: they hoiſt ſail when the wind ſuits. The five-men boat is 40 feet long and 15 broad, and of 25 tons burden; it is ſo called, though navigated by ſix men and a boy, becauſe one of the men is commonly hired to cook, &c. and does not ſhare in the profits with the other five. All our able fiſhermen go in theſe boats to the herring-fiſhery at Yarmouth the latter end of September, and return about the middle of November. The boats are then laid up until the beginning of Lent; at which time they go off in them to the edge of the Dogger, and other places, to fiſh for turbot, cod, ling, ſkaits, &c. They always take two cobles on board; and when they come upon their ground, anchor the boat, throw out the cobles, and fiſh in the ſame manner as thoſe do who go from the ſhore in a coble; with this difference only, that here each man is provided with double the quantity of lines, and inſtead of waiting the return of tide in the coble, return to the boat and bait their other lines; thus hawling one ſet, and ſhooting another every turn of tide. They commonly run into harbour twice a-week to deliver their fiſh. The five-men boat is decked at each end, but open in the middle, and has two large lug-ſails. The beſt bait for all kinds of fiſh is freſh herring cut in pieces of a proper ſize; and notwithſtanding what has been ſaid to the contrary, they are taken here at any time in the winter, and all the ſpring, whenever the fiſhermen put down their nets for that purpoſe. The five-men boats always take ſome nets for that end. Next to herrings are the leſſer lampreys, which come all winter by land-carriage from Tadcaſter. The Dutch alſo uſe theſe fiſh as baits in the turbot fiſhery, and purchaſe annually from the Thames fiſhermen as much as amounts to 700 l. worth for that purpoſe. The next baits in eſteem are ſmall haddocks cut in pieces, ſand-worms, muſcles, and limpets (called here *flidders*); and, laſtly, when none of theſe can be had, they uſe bullock's liver. The hooks uſed here are much ſmaller than thoſe employed at Iceland and Newfoundland. Experience has ſhewn, that the larger fiſh will take a living ſmall one upon the hook, ſooner than any bait that can be put on; therefore they uſe ſuch as the ſmall fiſh can ſwallow. The hooks are two inches and an half long in the ſhank, and near an inch wide between the ſhank and the point. The line is made of ſmall cording, and is always tanned before it is uſed.

Turbots, and all the rays, are extremely delicate in their choice of baits. If a piece of herring or haddock has been 12 hours out of the ſea, and then uſed as bait, they will not touch it. This ſpecies is of a remarkable ſquare form: the colour of the upper part of the body is cinereous, marked with numbers of black ſpots of different ſizes: the belly is white; the ſkin is without ſcales, but greatly wrinkled, and mixed with ſmall ſhort ſpines, diſperſed without any order.

PLEXUS, among anatomiſts, a bundle of ſmall veſſels interwoven in the form of net-work: thus a congeries of veſſels within the brain is called *plexus choroides*, *reticularis*, or *retiformis*. See ANATOMY, n° 397, c.

A plexus of nerves is an union of two or more nerves, forming a ſort of ganglion or knot.

PLICA POLONICA, in medicine, a diſeaſe of the hair, almoſt peculiar to Poland and Lithuania; and hence denominated *polonica*. It conſiſts of a preternatural bulk of the hair, which being firmly conglutinated and wrapped up in inextricable knots, and extended to a monſtrous length, affords a very unſeemly ſpectacle. When theſe are cut off, the blood is diſcharged from them, the head racked with pain, the ſight impaired, and the patient's life frequently endangered.

This diſorder is ſuppoſed to ariſe from the ſordid and naſty manner of life to which theſe people are addicted, and from an hereditary fault conveyed from the parents, which conſiſts in too great a bulk of the pores and bulbous hairs under the ſkin of the head: hence the thick and glutinous nutritious juice, produced by their coarſe aliments and impure waters, is by heat forced into the cavities of the hairs, and ſweating through their pores, produces this terrible diſeaſe.

A perfect method of curing this diſorder is unknown; undoubtedly becauſe, in thoſe parts of Poland in which this diſeaſe is endemial, there have been few phyſicians who, from what is commonly known of the nature and cure of the plica polonioa, have been able to lay down a rational and judicious plan for treating it. It is certain, that purging and veneſection are ſo far from being beneficial in this diſorder, that they often prove hurtful, by throwing the peccant humours into violent commotions, and more effectually diſtributing them through the whole body. It is therefore moſt ſafe and expedient to ſolicit the peccant matter to the hairs, to which it naturally tends: and this intention, Senertus ſays, is moſt effectually anſwered by lotions of bear's-breech.

PLINTH, ORLE, or ORLO, in architecture, a flat ſquare member, in the form of a brick. It is uſed as the foundation of columns, being that flat ſquare table under the moulding of the baſe and pedeſtal at the bottom of the whole order. It ſeems to have been originally intended to keep the bottom of the original wooden pillars from rotting. Vitruvius alſo calls the tuſcan abacus *plinth*.

PLINTH *of a Statue*, &c. is a baſe, either flat, round, or ſquare, that ſerves to ſupport it.

PLINTH *of a Wall*, denotes two or three rows of bricks advancing out from a wall; or, in general, any flat high moulding, that ſerves in a front-wall to mark the floors, to ſuſtain the eaves of a wall, or the larmier of a chimney.

PLINY the ELDER, or *Cæcilius Plinius Secundus*, one of the moſt learned men of ancient Rome, was deſcended from an illuſtrious family, and born at Verona. He bore arms in a diſtinguiſhed poſt; was one of the college of Augurs; became intendant of Spain; and was employed in ſeveral important affairs by Veſpaſian and Titus, who honoured him with their eſteem. The eruption of Mount Veſuvius, which happened in the year 79, proved fatal to him. His nephew, Pliny the Younger, relates the circumſtances of that dreadful eruption, and the death of his uncles, in a letter to Tacitus. Pliny the Elder wrote a Natural Hiſtory in 37 books, which is ſtill extant, and has had many editions; the moſt eſteemed of which is that of Father Hardouin, printed at Paris in 1723, in two volumes folio.

PLINY, *the Younger*, nephew of the former, was born in the ninth year of Nero, and the 62d of Chriſt, at Novocomum, a town upon the lake Larius, near which he had ſeveral beautiful villas. Cæcilius was the name of his father, and Plinius Secundus that of his mother's brother, who adopted him. He brought into the world with him fine parts and an elegant taſte, which he did not fail to cultivate early; for, as he tells us himſelf, he wrote a Greek tragedy at 14 years of age. He loſt his father when he was young; and had the famous Virginius for his tutor or guardian, whom he has ſet in a glorious light. He frequented the ſchools of the rhetoricians, and heard Quintilian; for whom he ever after entertained ſo high an eſteem, that he beſtowed a conſiderable portion upon his daughter at her marriage. He was in his 18th year when his uncle died; and it was then that he began to plead in the forum, which was the uſual road to dignities. About a year after, he aſſumed the military character, and went into Syria with the commiſſion of tribune: but this did not ſuit his taſte any more than it had done Tully's; and therefore we find him returning after a campaign or two. He tells us, that in his paſſage homewards he was detained by contrary winds at the iſland Icaria, and how he employed himſelf in making verſes: he enlarges in the ſame place upon his poetical exercitations; yet poetry was not the ſhining part of his character, any more than it had been of Tully's.

Upon his return from Syria, he married a wife, and ſettled at Rome: it was in the reign of Domitian. During this moſt perilous time, he continued to plead in the forum, where he was diſtinguiſhed not more by his uncommon abilities and eloquence, than by his great reſolution and courage, which enabled him to ſpeak boldly, when none elſe durſt ſcarcely ſpeak at all. On theſe accounts he was often ſingled out by the ſenate, to defend the plundered provinces againſt their oppreſſive governors, and to manage other cauſes of a like important and dangerous nature. One of theſe was for the province of Bœtica, in their proſecution of Bæbius Maſſa; in which he acquired ſo general an applauſe, that the emperor Nerva, then a private man, and in baniſhment at Tarentum, wrote him a letter, in which he congratulated not only Pliny, but the age which had produced an example ſo much in the ſpirit of the ancients. Pliny relates this affair in a letter to Cornelius Tacitus; and he was ſo pleaſed with it himſelf, that he could not help intreating this friend to record it in his hiſtory. He intreats him, however, with infinitely more modeſty than Tully had intreated Lucceius upon the ſame occaſion: and though he might imitate Cicero in the requeſt, as he profeſſes to have conſtantly ſet that great man before him for a model, yet he took care not to tranſgreſs the bounds of decency in his manner of making it. He obtained the offices of queſtor and tribune, and luckily went unhurt through the reign of Domitian: there is, however, reaſon to ſuppoſe, if that emperor had not died juſt as he did, that Pliny would have ſhared the fate of many other great men; for he tells us himſelf, that his name was afterwards found in Domitian's tablets, among the number of thoſe who were deſtined to deſtruction.

He loſt his wife in the beginning of Nerva's reign, and ſoon after took his beloved Calphurnia, of whom we read ſo much in his Epiſtles. He had not however any children by any of his wives: and hence we find him thanking Trajan for the *jus trium liberorum*, which he aftewards obtained of that emperor for his friend Suetonius Tranquillus. He hints alſo, in his letter of thanks to Trajan, that he had been twice married in the reign of Domitian. He was promoted to the conſulate by Trajan in the year 100, when he was 38 years of age; and in this office pronounced that famous panegyric, which has ever ſince been admired, as well for the copiouſneſs of the topics, as the elegance of addreſs. Then he was elected augur, and afterwards made proconſul of Bithynia, from whence he wrote to Trajan that curious letter concerning the primitive Chriſtians; which, with Trajan's reſcript, is happily extant among his Epiſtles. Pliny's letter, as Mr Melmoth obſerves in a note upon the paſſage, is eſteemed as almoſt the only genuine monument of eccleſiaſtical antiquity relating to the times immediately ſucceeding the apoſtles, it being written at moſt not above 40 years after the death of St Paul. It was preſerved by the Chriſtians themſelves, as a clear and unſuſpicious evidence of the purity of their doctrines; and is frequently appealed to by the early writers of the church againſt the calumnies of their adverſaries. It is not known what became of Pliny after his return from Bithynia; whether he lived at Rome, or what time he ſpent at his country-houſes. Antiquity is alſo ſilent as to the time of his death: but it is conjectured that he died either a little before or ſoon after that excelcellent prince, his admired Trajan; that is, about the year of Chriſt 116.

Pliny was one of the greateſt wits, and one of the worthieſt men, among the ancients. He had fine parts, which he cultivated to the utmoſt; and he accompliſhed himſelf with all the various kinds of knowledge which could ſerve to make him either uſeful or agreeable. He wrote and publiſhed a great number of things; but nothing has eſcaped the wreck of time, except the books of Letters, and the panegyric upon Trajan. This has ever been conſidered as a maſterpiece: and if he has, as ſome think, almoſt exhauſted all the ideas of perfection in a prince, and gone perhaps a little beyond the truth, yet it is allowed that no panegyriſt was ever poſſeſſed of a finer ſubject, and on which he might better indulge in all the flow of eloquence, without incurring the ſuſpicion of flattery and lies. His letters ſeem to have been intended for the public; and in them he may be conſidered as writing his own memoirs. Every epiſtle is a kind of hiſtorical ſketch, wherein we have a view of him in ſome ſtriking attitude, either of active or contemplative life. In them are preſerved anecdotes of many eminent perſons, whoſe works are come down to us, as Suetonius, Silius Italicus, Martial, Tacitus, and Quintilian; and of curious things, which throw great light upon the hiſtory of thoſe times. They are written with great politeneſs and ſpirit; and if they abound too much in turn and metaphor, we muſt impute it to that degeneracy of taſte which was then accompanying the degenerate manners of Rome. Pliny however ſeems to have preſerved himſelf in this latter reſpect from the general contagion: whatever the manners of the Romans were, his were pure and incorrupt. His writings breathe a ſpirit of tranſcendent goodneſs and humanity: his only imperfection is, he was too deſirous that the public and poſterity ſhould know how humane and good he was. We have two elegant Engliſh tranſlations of his Epiſtles; the one by Mr Melmoth, and the other by Lord Orrery.

PLOCE. See ORATORY, n° 67.

PLOT (Dr Robert), a learned antiquarian and philoſopher, was born at Sutton-barn, in the pariſh of Borden in Kent, in the year 1641, and ſtudied in Magdalen-hall, and afterwards in univerſity-college, Oxford. In 1682 he was elected ſecretary of the Royal Society, and publiſhed the Philoſophichal Tranſactions from N° 143 to N° 166 incluſive. The next year Elias Aſhmole, Eſq; appointed him firſt keeper of his muſeum, and about the ſame time the vice-chancellor nominated him firſt profeſſor of chemiſtry in that univerſity. In 1687 he was made ſecretary to the Earl Marſhal, and the following year received the title of *hiſtoriographer* to King James II. In 1690 he reſigned his profeſſorſhip of chemiſtry, and likewiſe his place of keeper of the muſeum, to which he preſented a very large collection of natural curioſities; which were thoſe he had deſcribed in his hiſtories of Oxfordſhire and Staffordſhire: the former publiſhed at Oxford in 1677, folio, and reprinted with additions and corrections in 1705; and the latter was printed in the ſame ſize in 1686. In January 1694-5, Henry Howard, Earl Marſhal, nominated him Mobray-herald extraordinary; two days after which he was conſtituted regiſter of the court of honour; and, on the 30th of April 1696, he died of the ſtone at his houſe in Borden.

As Dr Plot delighted in natural hiſtory, the above works were deſigned as eſſays towards a Natural Hiſtory of England; and he had actually formed a deſign of travelling through England and Wales for that purpoſe. He accordingly drew up a plan of his ſcheme in a letter to the learned Biſhop Fell; which is inſerted at the end of the ſecond volume of Leland's Itinerary, of the edition of 1744. Beſides the above works, he publiſhed *De origine fontium tentamen philoſophicum*, 8vo. and nine papers in the Philoſophical Tranſactions.

Plot, in dramatic poetry, is ſometimes uſed for the fable of a tragedy or comedy; but more particularly the knot or intrigue, which makes the *embarras* of any piece. See Poetry.

Plot, in ſurveying, the plan or draught of any field, farm, or manor, ſurveyed with an inſtrument, and laid down in the proper figure and dimenſions.

PLOTINUS, a Platonic philoſopher in the third century. His genius was greatly ſuperior to the vulgar herd of philoſophers, and was very ſingular and extraordinary. At 28 years of age he had a ſtrong deſire to ſtudy philoſophy, on which occaſion he was recommended to the moſt famous profeſſors of Alexandria. He was not ſatisfied with their lectures; but, upon hearing thoſe of Ammonius, he confeſſed that this was the man he wanted. He ſtudied for 11 years under that excellent maſter, and then went to hear the Perſian and Indian philoſophers. He afterwards read lectures of philoſophy at Rome; and in the 50th year of his age, Porphyry became his diſciple. Porphyry being reſolved to have every thing fully explained, Plotinus, to give him that ſatisfaction, was induced to write many books; 24 of which he compoſed during the ſix years that Porphyry was his diſciple; and theſe, added to 21 that he had written before Porphyry's arrival, with nine he compoſed after Porphyry's leaving Rome, made in all 54 books, which are divided into ſix Enneades, and are all upon very abſtruſe ſubjects. However, we may diſcover in them the traces of a fruitful, elevated, vaſt, and penetrating genius, and a cloſe method of reaſoning. The Romans had a high veneration for him; and he paſſed for a man of ſuch judgment and virtue, that many perſons of both ſexes, when they found themſelves dying, intruſted him, as a kind of guardian angel, with the care of their eſtates and children. He was the arbiter of numberleſs law-ſuits; and conſtantly behaved with ſuch humanity and rectitude of mind, that he did not create himſelf one enemy during the 26 years he reſided in Rome. He, however, did not meet with the ſame juſtice from all of his own profeſſion; for a philoſopher of Alexandria, being envious of his glory, uſed his utmoſt endeavours, though in vain, to ruin him. The emperor Gallienus, and the empreſs Salonina, had a very high regard for him; and, had it not been for the oppoſition of ſome jealous courtiers, they would have had the city of Campania rebuilt, and given to him with the territory belonging to it, to eſtabliſh a colony of philoſophers, and to have it governed by the ideal laws of Plato's commonwealth. He laboured under various diſorders during the laſt year of his life, which obliged him to leave Rome, when he was carried to Campania to the heirs of one of his friends, who furniſhed him with every thing neceſſary; and there he died in the year 270, aged 66. His 54 books are printed in Greek, with a Latin verſion, contents, and an analyſis of each book, by Marcillus Ficinus. His life was written by Porphyry, the moſt illuſtrious of his diſciples.

PLOUGH, in agriculture, a machine for turning up the ſoil, contrived to ſave the time, labour, and expences, that, without this inſtrument, muſt have been employed in digging land, to prepare for the ſowing of all kinds of grain. See Agriculture, n° 77, &c.

PLOUGHMAN, the perſon who guides the plough in the operation of tilling.

PLOUGHING, in agriculture, the turning up the earth with a plough. See Agriculture, Part II. *paſſim*.

PLOVER, in ornithology, a ſpecies of Charadrius.

Theſe birds uſually fly in exceedingly large flocks in the places they frequent; people talk of 20,000 or or 30,000 being ſeen in a flock. They generally come to us in September, and leave us about the end of March. In cold weather they are found very commonly on lands lying near the ſea, in queſt of food; but in thaws and open ſeaſons, they go higher up in the country.

They love to feed on ploughed lands, but never remain long at a time on them, for they are very cleanly in their nature; and the dirt which lodges on their beaks and feet, give them ſo much uneaſineſs, that they fly to the neareſt water to waſh themſelves. When they rooſt, they do not go to trees or hedges; but ſit ſquatting on the ground like ducks or geeſe, far from trees or hedges, when the weather is calm; but when it is ſtormy, they often get under ſhelter. In wet weather they do not ſleep in the night at all, but run about picking up the worms as they crawl out of the ground; during this feeding they are continually making a ſmall cry, that ſerves to keep them together, and in the morning they take flight. If in their flight they ſpy any others on the ground, they call them up; and if they refuſe to come, the whole body deſcends to ſee what food there is in the place that detains them.

Plovers are very eaſily taken at the time of their firſt coming over, when they have not got any other birds mixed among them; but when they afterwards pick up the teal and other ſhy birds among them, it becomes more difficult. The beſt ſeaſon for taking them is in October; eſpecially in the beginning of that month: after this they grow timorous, and are not eaſily taken again till March, which is the time of their coupling. The ſevereſt froſts are not the beſt ſeaſon for taking them in neſt, but variable weather does better. The north-weſt wind is found diſadvantageous to the taking of them; and in general, great regard is to be paid to the courſe of the wind in the ſetting of the nets. All ſea-fowl fly againſt the wind when the land lies that way; and the nets for taking them are therefore to be placed in a proper direction accordingly.

PLOWDEN (Edmund), ſerjeant at law, was the ſon of Humphrey Plowden, of Plowden in Shropſhire, of an ancient and genteel family. He was firſt a ſtudent of the univerſity of Cambridge, where he ſpent three years in the ſtudy of philoſophy and medicine. He then removed to Oxford, where, having continued his former ſtudies about four years more, in 1552 he was admitted to the practice of phyſic and ſurgery: but probably finding the practice of the art of healing leſs agreeable than the ſtudy, he entered himſelf of the Middle Temple, and began to read law. Wood ſays, that in 1557 he was ſummer-reader to that ſociety, and Lent-reader three years after, being then ſerjeant, and oracle of the law. He died in the year 1584, aged 67; and was buried in the Temple church, near the north wall, at the eaſt end of the choir. He married the daughter of William Sheldon of Boley in Worceſterſhire; by whom he had a ſon, who died ſoon after his father. He wrote, 1. Commentaries or Reports of divers Caſes, &c. in the reigns of king Ed. VI. queen Mary, and queen Elizabeth; Lond. 1571, 78, 99, 1613, &c. Written in the old Norman language. 2. Queries, or a Moot-book of caſes, &c. tranſlated, methodized, and enlarged, by H. B. of Lincoln's-inn; Lond. 1662, 8vo.

PLUG, certain pieces of timber, formed like the fruſtum of a cone, and uſed to ſtop the hauſe-holes, and the breaches made in the body of a ſhip by cannon-balls; the former of which are called *hauſe-plugs*, and the latter *ſhot-plugs*, which are formed of various ſizes in proportion to the holes made by the different ſizes of ſhot, which may penetrate the ſhip's ſides or bottom in battle; accordingly they are always ready for this purpoſe.

PLUKENET (Leonard), a phyſician who flouriſhed in the reign of king Charles II. was one of the moſt excellent and laborious botaniſts of that or any other age. He was author of the *Phytographia Plucenetiana*, the *Almageſticum Britannicum*, and other works of the like kind, on which he ſpent the greateſt part of his life and fortune. His Phytography is mentioned with the higheſt encomiums in the Philoſophical Tranſactions for February 1696-7. His *Opera Botanica*, with cuts, were printed at London in 6 vols, fol. in 1720.

PLUM-TREE, in botany. See PRUNUS.

PLUMAGE, the feathers which ſerve birds for a covering. See ORNITHOLOGY, p. 5757.

PLUMB-LINE, among artificers, denotes a perpendicular to the horizon; ſo called, as being commonly erected by means of a plummet.

PLUMBERY, the art of caſting and working lead, and uſing it in building.

As this metal melts ſoon and with little heat, it is eaſy to caſt it into figures of any kind, by running it into moulds of braſs, clay, plaſter, &c. But the chief article in plumbery is ſheets and pipes of lead; and as theſe make the baſis of the plumber's work, we ſhall here give the proceſs of making them.

In caſting *ſheet-lead*, a table or mould is made uſe of, which conſiſts of large pieces of wood well jointed, and bound with bars of iron at the ends; on the ſides of which runs a frame conſiſting of a ledge or border of wood, three inches thick, and four inches high from the mould, called the *ſharps*: the ordinary width of the mould, within theſe ſharps, is from four to five feet; and its length is 16, 17, or 18 feet. This ſhould be ſomething longer than the ſheets are intended to be, in order that the end where the metal runs off from the mould may be cut off, becauſe it is commonly thin, or uneven, or ragged at the end. It muſt ſtand very even or level in breadth, and ſomething falling from the end in which the metal is poured in, viz. about an inch, or an inch and a half, in the length of 16 or 17 feet or more, according to the thinneſs of the ſheets wanted; for the thinner the ſheet, the more declivity the mould ſhould have. At the upper end of the mould ſtands the pan, which is a concave triangular priſm, compoſed of two planks nailed together at right angles, and two triangular pieces fitted in between them at the ends. The length of this pan is the whole breadth of the mould in which the ſheets are caſt; it ſtands with its bottom, which is a ſharp edge, on a form at the end of the mould, leaning with one ſide againſt it; and on the oppoſite ſide is a handle to lift it up by, to pour out the melted lead; and on that ſide of the pan next the mould, are two iron-hooks to take hold of the mould, and prevent the pan from ſlipping while the melted lead is pouring out of it into the mould. This pan is lined on the inſide with moiſtened ſand, to prevent it from being fired by the hot metal. The mould is alſo ſpread over, about two inches thick, with ſand ſifted and moiſtened, which is rendered perfectly level by moving over it a piece of wood called a *ſtrike*, and ſmoothing it over with a ſmoothing plane, which is a plate of poliſhed braſs, about one-fourth of an inch thick, and nine inches ſquare, turned up on all the four edges, and with a handle fitted on to the upper or concave ſide. The ſand being thus ſmoothed, it is fit for caſting ſheets of lead: but if they would caſt a ciſtern, they meaſure out the bigneſs of the four ſides; and having taken the dimenſions of the front or fore-part, make mouldings by preſſing long ſlips of wood, which contain the ſame mouldings, into the level ſand; and form the figures of birds, beaſts, &c. by preſſing in the ſame manner leaden figures upon it, and then taking them off, and at the ſame time ſmoothing the ſurface where any of the ſand is raiſed up by making theſe impreſſions upon it. The reſt of the operation is the ſame in caſting either ciſterns or plain ſheets of lead: but before we proceed to mention the manner in which that is performed, it will be neceſſary to give a more particular deſcription of the *ſtrike*. The ſtrike, then, is a piece of board about five inches broad, and ſomething longer than the breadth of the mould on the inſide; and at each end is cut a notch, about two inches deep, ſo that when it is uſed, it rides upon the ſharps with thoſe notches. Before they begin to caſt, the ſtrike is made ready by tacking on two pieces of an old hat on the notches, or by ſlipping a caſe of leather over each end, in order to raiſe the under ſide about one-eighth of an inch, or ſomething more, above the ſand, according as they would have the ſheet to be in thickneſs; then they tallow the under edge of the ſtrike, and lay it acroſs the mould. The lead being melted, it is put into the pan with ladles, in which, when there is a ſufficient quantity for the preſent purpoſe, the ſcum of the metal is ſwept off with a piece of board to the edge of the pan, letting it ſettle on the ſand, which is by this means prevented from falling into the mould at the pouring out of the metal. When the lead is cool enough, which much be regulated according to the thickneſs of the ſheets wanted, and is known by its beginning to ſtand with a ſhell or wall on the ſand round the pan, two men take the pan by the handle, or elſe one of them lift it by the bar and chain fixed to a beam in the ceiling, and pour it into the mould, while another man ſtands ready with the ſtrike, and, as ſoon as they have done pouring in the metal, puts on the mould, ſweeps the lead forward, and draws the overplus into a trough prepared to receive it. The ſheets being thus caſt, nothing remains but to roll them up, or cut them into any meaſure wanted: but if it be a ciſtern, it is bent into four ſides, ſo that the two ends may join the back, where they are ſoldered together; after which the bottom is ſoldered up.

The method of caſtiug pipes without ſoldering. To make theſe pipes they have a kind of little mill, with arms or levers to turn it withal. The moulds are of braſs, and conſiſt of two pieces, which open and ſhut by means of hooks and hinges, their inward caliber or diameter being according to the ſize of the pipe, uſually two feet and a half. In the middle is placed a core or round piece of braſs or iron, ſomewhat longer than the mould, and of the thickneſs of the inward diameter of the pipe. This core is paſſed through two copper rundles, one at each end of the mould, which they ſerve to cloſe; and to theſe is joined a little copper tube about two inches long, and of the thickneſs the leaden pipe is intended to be of. By means of theſe tubes, the core is retained in the middle of the cavity of the mould. The core being in the mould, with the rundles at its two ends, and the lead melted in the furnace, they take it up in a ladle, and pour it into the mould by a little aperture at one end, made in the form of a funnel. When the mould is full, they paſs a hook into the end of the core, and, turning the mill, draw it out; and then opening the mould, take out the pipe. If they deſire to have the pipe lengthened, they put one end of it in the lower end of the mould, and paſs the end of the core into it; then ſhut the mould again, and apply its rundle and tube as before, the pipe juſt caſt ſerving for rundle, &c. at the other end. Things being thus replaced, they pour in freſh metal, and repeat the operation till they have got a pipe of the length required.

For making pipes of ſheet-lead, the plumbers have wooden cylinders, of the length and thickneſs required; and on theſe they form their pipes by wrapping the ſheet around them, and ſoldering up the edges all along them.

PLUMBUM, LEAD. See LEAD.

PLUMBUM *Corneum*, a combination of lead with the marine acid. See CHEMISTRY, n° 249.

PLUME, in botany, the bud or germ. See GEMMA.

PLUMIRE (Charles), a learned Minim, born at Marſeilles, and one of the moſt able botaniſts of the 17th century. He was inſtructed by the famous Maignan, who taught him mathematics, turnery, the art of making ſpectacles, burning-glaſſes, microſcopes, and other works. He at length went to Rome to perfect himſelf in his ſtudies, and there applied himſelf entirely to botany under a ſkilful Italian. At his return to Provence, he ſettled in the convent at Bornes, a maritime place near Hieres, where he had the conveniency of making diſcoveries in the fields with reſpect to ſimples. He was ſome time after ſent by the French king to America, to bring from thence ſuch plants as might be of ſervice in medicine. He made three different voyages to the Antilles, and ſtopped at the iſland of St Domingo. The king honoured him with a penſion; and he at laſt ſettled at Paris. However, at the deſire of M Fagon, he prepared to go a fourth time to America, to examine the tree which produces the Jeſuits bark; but died at the port of Santa Maria, near Cadiz, in 1706. He wrote ſeveral excellent works; the principal of which are, 1. A volume of the plants in the American Iſlands. 2. A treatiſe on the American fern. 3. The Art of Turnery; a curious work embelliſhed with plates.

PLUMMET, PLUMB-*Rule*, or *Plumb-line*, an inſtrument uſed by carpenters, maſons, &c. in order to judge whether walls, &c. be upright planes, horizontal, or the like. It is thus called from a piece of lead, faſtened to the end of a chord, which uſually conſtitutes this inſtrument. Sometimes the ſtring deſcends along a wooden ruler, &c. raiſed perpendicularly on another; in which caſe it becomes a level.

PLUMMING, among miners, is the method of uſing a mine-dial, in order to know the exact place of the work where to ſink down an air-ſhaft, or to bring an adit to the work, or to know which way the load inclines when any flexure happens in it.

It is performed in this manner: A ſkilful perſon, with an aſſiſtant, and with pen, ink, and paper, and a long line, and a ſun-dial, after his gueſs of the place above-ground, deſcends into the adit or work, and there faſtens one end of the line to ſome fixed thing in it; then the incited needle is let to reſt, and the exact point where it reſts is marked with a pen: he then goes on farther in the line ſtill faſtened, and at the next flexure of the adit he makes a mark on the line by a knot or otherwiſe: and then letting down the dial again, he there likewiſe notes down that point at which the needle ſtands in this ſecond poſition. In this manner he proceeds, from turning to turning, marking down the points, and marking the line, till he comes to the intended place: this done, he aſcends, and begins to work on the ſurface of the earth what he did in the adit, bringing the firſt knot in the line to ſuch a place where the mark of the place of the needle will again anſwer its pointing, and continues this till he come to the deſired place above ground, which is certain to be perpendicular over the part of the mine into which the air-ſhaft is to be ſunk.

PLUMOSE, ſomething formed in the manner of a feather, with a ſtem and fibres iſſuing from it on each ſide; ſuch are the antennæ of certain moths, butterflies, &c.

PLURAL, in grammar, an epithet applied to that number of nouns and verbs which is uſed when we ſpeak of more than one thing. See GRAMMAR.

PLURALITY, a diſcrete quantity, conſiſting of two or a greater number of the ſame kind: thus we ſay, a plurality of gods, &c.

PLUS, in algebra, a character marked thus +, uſed for the ſign of addition. See ALGEBRA, n° 2, 3.

PLUSH, in commerce, &c. a kind of ſtuff, having a ſort of velvet knap, or ſhag, on one ſide, compoſed regularly of a woof of a ſingle woollen thread, and a double warp; the one wool, of two threads twiſted; the other goats or camels hair; tho' there are ſome pluſhes entirely of worſted, and others compoſed wholly of hair.

PLUTARCH, a great philoſopher and hiſtorian of antiquity, who lived from the reign of Claudius to that of Hadrian, was born at Chæronea, a ſmall city of Bœotia in Greece. Plutarch's family was ancient in Chæronea: his grandfather Lamprias was eminent for his learning, and a philoſopher; and is often mentioned by Plutarch in his writings, as is alſo his father. Plutarch was initiated early in ſtudy, to which he was naturally inclined; and was placed under the care of Ammonius, an Egyptian, who, having taught philoſophy with great reputation at Alexandria, from thence travelled into Greece, and ſettled at Athens. Under this maſter, he made great advances in knowledge; and like a thorough philoſopher, more apt to regard things than words, he purſued this knowledge to the neglect of languages. The Roman language, at that time, was not only the language of Rome, but of Greece alſo; and much more uſed there than the French is now in England. Yet he was ſo far from regarding it then, that, as we learn from himſelf, he became not converſant in it till the declenſion of his life; and, though he is ſuppoſed to have reſided in Rome near 40 years at different times, yet he never ſeems to have acquired a competent ſkill in it. But this was not the worſt: he did not cultivate his mother-tongue with any great exactneſs; and hence that harſhneſs, inequality, and obſcurity in his ſtyle, which has ſo frequently and ſo juſtly been complained of.

After he was principled and grounded by Ammonius, having a ſoul inſatiable of knowledge, he reſolved to travel. Egypt was at that time, as formerly it had been, famous for learning; and probably the myſteriouſneſs of their doctrine might tempt him, as it had tempted Pythagoras and others, to go and converſe with the prieſthood of that country. This appears to have been particularly his buſineſs, by his treatiſe, "Of Iſis and Oſiris:" in which he ſhews himſelf verſed in the ancient theology and philoſophy of the wiſe men. From Egypt he returned into Greece; and viſiting in his way all the academies and ſchools of the philoſophers, gathered from them many of thoſe obſervations with which he has abundantly enriched poſterity. He does not ſeem to have been attached to any particular ſect, but culled from each of them whatever he thought excellent and worthy to be regarded. He could not bear the paradoxes of the Stoics, but yet was more averſe from the impiety of the Epicureans: in many things he followed Ariſtotle; but his favourites were Socrates and Plato, whoſe memory he revered ſo highly, that he annually celebrated their birth-days with much ſolemnity. Beſides this, he applied himſelf with extreme diligence to collect, not only all books that were excellent in their kind, but alſo all the ſaying and obſervations of wiſe men, which he had heard in converſation, or had received from others by tradition; and likewiſe to conſult the records and public inſtruments preſerved in cities which he had viſited in his travels. He took a particular journey to Sparta, to ſearch the archives of that famous commonwealth, to underſtand thoroughly the model of their ancient government, the hiſtory of their legiſlators, their kings, and their ephori; and digeſted all their memorable deeds and ſayings with much care. He took the ſame methods with regard to many other commonwealths; and thus was enabled to leave us in his works ſuch a rich cabinet of obſervations upon men and manners, as, in the opinion of Montaigne and Bayle, have rendered him the moſt valuable author of antiquity.

The circumſtances of Plutarch's life are not known, and therefore cannot be related with any exactneſs. He was married; and his wife's name was *Timoxena*, as Rualdus conjectures with probability. He had ſeveral children, and among them two ſons; one called *Plutarch* after himſelf; the other *Lamprias*, in memory of his grandfather. Lamprias was he, of all his children, who ſeems to have inherited his father's philoſophy; and to him we owe the table or catalogue of Plutarch's writings, and perhaps alſo his apophthegms. He had a nephew, Sextus Chæroneus, who taught the learned emperor Marcus Aurelius the Greek tongue, and was much honoured by him. Some think, that the critic Longinus was of his family; and Apuleius, in the firſt book of his Metamorphoſes, affirms himſelf to be deſcended from him.

On what occaſion, and at what time of his life, he went to Rome, how long he lived there, and when he finally returned to his own country, are all uncertain. It is probable, that the fame of him went thither before him, not only becauſe he had publiſhed ſeveral of his works, but becauſe immediately upon his arrival, as there is reaſon to believe, he had a great reſort of the Roman nobility to hear him: for he tells us himſelf, that he was ſo taken up in giving lectures of philoſophy to the great men of Rome, that he had not time to make himſelf maſter of the Latin tongue, which is one of the firſt things that would naturally have engaged his attention. It appears that he was ſeveral times at Rome; and perhaps one motive to his inhabiting there was the intimacy he had contracted in ſome of theſe journeys with Soſſius Senecio, a great and worthy man, who had been four times conſul, and to whom Plutarch has dedicated many of his lives. But the great inducement which carried him firſt to Rome, was undoubtedly that which had carried him into ſo many other parts of the world; namely, to make obſervations upon men and manners, and to collect materials for writing the lives of the Roman worthies, in the ſame manner as he had already written thoſe of the Grecian: and accordingly he not only converſed with all the living, but ſearched the records of the Capitol, and of all the libraries. Not but, as we learn from Suidas, he was intruſted alſo with the

Plutarch.

management of public affairs in the empire, during his reſidence in the metropolis: "Plutarch (ſays he) lived in the time of Trajan, who beſtowed on him the conſular ornaments, and alſo cauſed an edict to be paſſed, that the magiſtrates or officers of Illyria ſhould do nothing in that province without his knowledge and approbation."

When, and how, he was made known to Trajan, is likewiſe uncertain: but it is generally ſuppoſed, that Trajan, a private man when Plutarch firſt came to Rome, was, among other nobility, one of his auditors. It is alſo ſuppoſed, that this wiſe emperor made uſe of him in his councils; at leaſt, much of the happineſs of his reign has been imputed to Plutarch. We are equally at a loſs concerning the time of his abode in the imperial city; which, however, at different times, is not imagined to fall much ſhort of 40 years. The deſire of viſiting his native country, ſo natural to all men, and eſpecially when growing old, prevailed with him at length to leave Italy; and at his return, he was unanimouſly choſen archon or chief magiſtrate of Chæronea, and not long after admitted into the number of the Delphic Apollo's prieſts. We have no particular account of his death, either as to the manner of it, or the year; only it is evident that he lived, and continued his ſtudies, to an extreme old age.

His works have been divided, and they admit of a pretty equal diviſion, into Lives and Morals: the former of which, in his own eſtimation, were to be preferred as more noble than the latter. His ſtyle, as we have already obſerved, has been excepted to with ſome reaſon: he has alſo been criticiſed for ſome miſtakes in Roman antiquities, and for a little partiality to the Greeks. On the other hand, he has been juſtly praiſed for the copiouſneſs of his fine ſenſe and learning, for his integrity, and for a certain air of goodneſs which appears in all he wrote. His buſineſs was not to pleaſe the ear, but to inſtruct and charm the mind; and in this none ever went beyond him.

Pluto | Plying.

PLUTO, in Pagan worſhip, the king of the infernal regions, was the ſon of Saturn and Ops, and the brother of Jupiter and Neptune. This deity finding himſelf childleſs and unmarried, mounted his chariot to viſit the world; and arriving in Sicily, fell in love with Proſerpine, whom he ſaw gathering flowers with her companions in the valley of Enna, near Mount Ætna; when forcing her into his chariot, he drove her to the river Chemarus, thro' which he opened himſelf a paſſage back to the realms of night. See CERES and PROSERPINE.

Pluto is uſually repreſented in an ebony chariot drawn by four black horſes; ſometimes holding a ſceptre, to denote his power; at others, a wand, with which he drives away the ghoſts; and at others, ſome keys, to ſignify that he had the keys of death. Homer obſerves, that his helmet had the quality of rendering the wearer inviſible, and that Minerva borrowed it in order to be concealed from Mars when he fought againſt the Trojans. Pluto was greatly revered both by the Greeks and Romans, who erected temples and altars to him. To this god ſacrifices were offered in the night, and it was not lawful to offer them by day.

PLUTUS, in Pagan worſhip, the god of riches, is frequently confounded with Pluto. He was repreſented as appearing lame when he approached, and with wings at his departure; to ſhow the difficulty of amaſſing wealth, and the uncertainty of its enjoyment. He was alſo frequently repreſented blind, to ſhow that he often beſtowed his favours on the moſt unworthy, and left in neceſſity thoſe who had the greateſt merit.

PLUVIALIS. See CHARADRIUS.

PLYING, in the ſea-language, the act of making, or endeavouring to make, a progreſs againſt the direction of the wind. Hence a ſhip, that advances well in her courſe in this manner of ſailing, is ſaid to be a good plyer. See the articles BEATING and TACKING.

PNEUMATICS.

PNEUMATICS, called alſo PNEUMATOLOGY and *Pneumatoſophy*, among ſchoolmen, the doctrine and contemplation of ſpirits and ſpiritual ſubſtances, as God, angels, and the human ſoul; in which ſenſe *pneumatics* are the ſame with what we otherwiſe call *metaphyſics*. See the article METAPHYSICS.

PNEUMATICS is more commonly uſed among us for that branch of natural philoſophy which treats of the weight, preſſure, and elaſticity of the AIR, and the effects ariſing from it.

SECT. I. *Of the Properties of Air.*

THE air is that thin tranſparent fluid body in which we live and breathe. It encompaſſes the whole earth to a conſiderable height; and, together with the clouds and vapours that float in it, is called the *atmoſphere*. The air is juſtly reckoned among the number of fluids, becauſe it has all the properties by which a fluid is diſtinguiſhed. For, it yields to the leaſt force impreſſed, its parts are eaſily moved among one another, it preſſes according to its perpendicular height, and its preſſure is every way equal.

That the air is a fluid, conſiſting of ſuch particles as have no coheſion betwixt them, but eaſily glide over one another, and yield to the ſlighteſt impreſſion, appears from that eaſe and freedom with which animals breathe in it, and move through it without any difficulty or ſenſible reſiſtance.

But it differs from all other fluids in the three following particulars. 1. It can be compreſſed into a much leſs ſpace than that which it naturally poſſeſſeth. 2. It cannot be congealed or fixed, as other fluids may. 3. It is of a different denſity in every part, upward from the earth's ſurface; decreaſing in its weight, bulk for bulk, the higher it riſes; and therefore muſt alſo decreaſe in denſity. 4. It is of an elaſtic or ſpungy nature, and the force of its ſpring is equal to its weight.

That air is a body, is evident from its excluding all other bodies out of the ſpace it poſſeſſes: for if a glaſs jar be plunged with its mouth downwards into a

operties
the Air.

a veſſel of water, there will but very little water get into the jar, becauſe the air of which it is full keeps the water out.

As air is a body, it muſt needs have gravity or weight: and that it is weighty, is demonſtrated by experiment. For, let the air be taken out of a veſſel by means of the air-pump, then having weighed the veſſel, let in the air again, and upon weighing it, when re-filled with air, it will be found conſiderably heavier. Thus, a bottle that holds a wine quart, being emptied of air and weighed, is found to be about 17 grains lighter than when the air is let into it again; which ſhews that a quart of air weighs 17 grains. But a quart of water weighs 14625 grains; thus divided by 17, quotes 860 in round numbers; which ſhews, that water is 860 times as heavy as air near the ſurface of the earth.

As the air riſes above the earth's ſurface, it grows rarer, and conſequently lighter, bulk for bulk. For ſince it is of an elaſtic or ſpringy nature, and its lowermoſt parts are preſſed with the weight of all that is above them, it is plain that the air muſt be more denſe or compact at the earth's ſurface, than at any height above it; and gradually rarer the higher up. For the denſity of the air is always as the force that compreſſeth it: and therefore the air towards the upper parts of the atmoſphere being leſs preſſed than that which is near the earth, it will expand itſelf, and thereby become thinner than at the earth's ſurface.

Dr Cotes has demonſtrated, that if altitudes in the air be taken in arithmetical proportion, the rarity of the air will be in geometrical proportion. For inſtance,

At the altitude of	Miles above the ſurface of the earth, the air is	times thinner and lighter than at the earth's ſurface.
	7	4
	14	16
	21	64
	28	256
	35	1024
	42	4096
	49	16384
	56	65536
	63	262144
	70	1048576
	77	4194304
	84	16777216
	91	67108864
	98	268435456
	105	1073741824
	112	4294967296
	119	17179869184
	126	68719476736
	133	274877906944
	140	1099511627776

And hence it is eaſy to prove by calculation, that a cubic inch of ſuch air as we breathe would be ſo much rarefied at the altitude of 500 miles, that it would fill a ſphere equal in diameter to the orbit of Saturn.

The weight or preſſure of the air is exactly determined by the following experiment.

Take a glaſs tube about three feet long, and open at one end; fill it with quickſilver, and, putting your finger upon the open end, turn that end downward, and immerſe it into a ſmall veſſel of quickſilver, without letting in any air: then take away your finger, and the quickſilver will remain ſuſpended in the tube 29½ inches above its ſurface in the veſſel; ſometimes more, and at other times leſs, as the weight of the air is varied by winds and other cauſes. That the quickſilver is kept up in the tube by the preſſure of the atmoſphere upon that in the baſon, is evident; for, if the baſon and tube be put under a glaſs, and the air be then taken out of the glaſs, all the quickſilver in the tube will fall down into the baſon; and if the air be let in again, the quickſilver will riſe to the ſame height as before. Therefore the air's preſſure on the ſurface of the earth is equal to the weight of 29½ inches depth of quickſilver all over the earth's ſurface, at a mean rate.

Properties
of the Air.

A ſquare column of quickſilver, 29½ inches high, and one inch thick, weighs juſt 15 pounds, which is equal to the preſſure of air upon every ſquare inch of the earth's ſurface; and 144 times as much, or 2160 pounds, upon every ſquare foot; becauſe a ſquare foot contains 144 ſquare inches. At this rate, a middle-ſized man, whoſe ſurface may be about 14 ſquare feet, ſuſtains a preſſure of 30240 pounds, when the air is of a mean gravity: a preſſure which would be inſupportable, and even fatal to us, were it not equal on every part, and counterbalanced by the ſpring of the air within us, which is diffuſed through the whole body, and re-acts with an equal force againſt the outward preſſure.

Now, ſince the earth's ſurface contains (in round numbers) 200,000,000 ſquare miles, and every ſquare mile 27,878,400 ſquare feet, there muſt be 5,575,680,000,000,000 ſquare feet on the earth's ſurface; which multiplied by 2160 pounds (the preſſure on each ſquare foot) gives 12,043,468,800,000,000,000 pounds for the preſſure or weight of the whole atmoſphere.

When the end of a pipe is immerſed in water, and the air is taken out of the pipe, the water will riſe in it to the height of 33 feet above the ſurface of the water in which it is immerſed; but will go no higher: for it is found, that a common pump will draw water no higher than 33 feet above the ſurface of the well; and unleſs the bucket goes within that diſtance from the well, the water will never get above it. Now, as it is the preſſure of the atmoſphere on the ſurface of the water in the well that cauſes the water to aſcend in the pump, and follow the piſton or bucket, when the air above it is lifted up; it is evident, that a column of water 33 feet high, is equal in weight to a column of quickſilver of the ſame diameter, 29½ inches high; and to as thick a column of air, reaching from the earth's ſurface to the top of the atmoſphere.

In ſerene calm weather, the air has weight enough to ſupport a column of quickſilver 31 inches high; but in tempeſtuous ſtormy weather, not above 28 inches. The quickſilver thus ſupported in a glaſs tube, is found to be a nice counterbalance to the weight or preſſure of the air, and to ſhew its alterations at different times. And being now generally uſed to denote the changes in the weight of the air, and of the weather conſequent upon them, it is called the *barometer* or *weather-glaſs*. See **Barometer**.

The preſſure of the air being equal on all ſides of a body

Experiments.

body expoſed to it, the ſofteſt bodies ſuſtain this preſſure without ſuffering any change in their figure; and ſo do the moſt brittle bodies without being broke.

Sect. II. *Experiments with the Air-pump, ſhewing the Reſiſtance, Weight, and Elaſticity of the Air.*

Plate CCXLIII. fig. 8.

The Air-pump being in effect the ſame as the water-pump, whoever underſtands the one will be at no loſs to underſtand the other.

iii. The air-pump.

Having put a wet leather on the plate LL of the air-pump, place the glaſs-receiver M upon the leather, ſo that the hole *i* in the plate may be within the glaſs. Then turning the handle F backward and forward, the air will be pumped out of the receiver; which will then be held down to the plate by the preſſure of the external air or atmoſphere: for as the handle (fig. 9.) is turned backwards, it raiſes the piſton *d e* in the barrel BK, by means of the wheel F and rack D*d*; and as the piſton is leathered ſo tight as to fit the barrel exactly, no air can get between the piſton and barrel: and therefore all the air above *d* in the barrel is lifted up towards B, and a vacuum is made in the barrel from *e* to *b*; upon which, part of the air in the receiver M (fig. 8.), by its ſpring, ruſhes through the hole *i*, in the braſs plate LL, along the pipe GCG, (which communicates with both barrels by the hollow trunk IHK (fig. 9.), and puſhing up the valve *b*, enters into the vacant place *b e* of the barrel BK: for wherever the reſiſtance or preſſure is taken off, the air will run to that place, if it can find a paſſage.—Then as the handle F is turned forward, the piſton *d e* will be depreſſed in the barrel; and as the air which had got into the barrel cannot be puſhed back through the valve *b*, it will aſcend through a hole in the piſton, and eſcape through the valve at *d*, and be hindered by that valve from returning into the barrel when the piſton is again raiſed. At the next raiſing of the piſton, a vacuum is again made in the ſame manner as before, between *b* and *e*; upon which more of the air which was left in the receiver M, gets out thence by its ſpring, and runs into the barrel BK, through the valve B. The ſame thing is to be underſtood with regard to the other barrel AI; and as the handle F is turned backwards and forwards, it alternately raiſes and depreſſes the piſtons in their barrels; always raiſing one whilſt it depreſſes the other. And as there is a vacuum made in each barrel when its piſton is raiſed, every particle of air in the receiver M puſhes out another, by its ſpring or elaſticity, through the hole *i*, and pipe GG, into the barrels; until at laſt the air in the receiver comes to be ſo much dilated, and its ſpring ſo far weakened, that it can no longer get thro' the valves; and then no more can be taken out. Hence there is no ſuch thing as making a perfect vacuum in the receiver; for the quantity of air taken out at any one ſtroke, will always be as the denſity thereof in the receiver: and therefore it is impoſſible to take it all out; becauſe, ſuppoſing the receiver and barrels of equal capacity, there will be always as much left as was taken out at the laſt turn of the handle.

There is a cock *k* below the pump-plate, which being turned, lets the air into the receiver again; and then the receiver becomes looſe, and may be taken off the plate. The barrels are fixed to the frame E *e e* by two ſcrew-nuts *ff*, which preſs down the top-piece E upon the barrels; and the hollow trunk H (in fig. 9.) is covered by a box, as GH in fig 8.

There is a glaſs tube *lmmmn* open at both ends, and about 34 inches long; the upper end communicating with the hole in the pump-plate, and the lower end immerſed in quickſilver at *n* in the veſſel N. To this tube is fitted a wooden ruler *mm*, called the *gage*, which is divided into inches and parts of an inch, from the bottom at *n*, (where it is even with the ſurface of the quickſilver), and continued up to the top, a little below *l*, to 30 or 31 inches.

As the air is pumped out of the receiver M, it is likewiſe pumped out of the glaſs tube *lmn*, becauſe that tube opens into the receiver through the pump-plate; and as the tube is gradually emptied of air, the quickſilver in the veſſel N is forced up into the tube by the preſſure of the atmoſphere. And if the receiver could be perfectly exhauſted of air, the quickſilver would ſtand as high in the tube as it does at that time in the barometer: for it is ſupported by the ſame power or weight of the atmoſphere in both (A).

The quantity of air exhauſted out of the receiver on each turn of the handle, is always proportionable to the aſcent of the quickſilver on that turn; and the quantity of air remaining in the receiver, is proportionable to the defect of the height of the quickſilver in the gage from what it is at that time in the barometer.

iv. Experiments t ſhow th air's re ance. Fig. 10

1. There is a little machine, conſiſting of two mills, *a* and *b*, which are of equal weights, independent of each other, and turn equally free on their axis in the frame. Each mill has four thin arms or ſails fixed into the axis: thoſe of the mill *a* have their planes at right angles to its axis; and thoſe of *b* have their planes parallel to it. Therefore, as the mill *a* turns round in common air, it is but little reſiſted thereby, becauſe its ſails cut the air with their thin edges; but the mill *b* is much reſiſted, becauſe the broad ſides of its ſails move againſt the air when it turns round. In each axle is a pin near the middle of the frame, which goes quite through the axle, and ſtands out a little on each ſide of it: upon theſe pins the ſlider *d* may be made to bear, and ſo hinder the mills from going, when the ſtrong ſpring *c* is ſet on bend againſt the oppoſite ends of the pins.

Having ſet this machine upon the pump-plate LL, (fig. 8.) draw up the ſlider *d* to the pins on one ſide, and ſet the ſpring *c* at bend upon the oppoſite ends of the pins: then puſh down the ſlider *d*, and the ſpring acting equally ſtrong upon each mill, will ſet them both a-going with equal forces and velocities: but the mill *a* will run much longer than the mill *b*, becauſe the air makes much leſs reſiſtance againſt the edges of its ſails than againſt the ſides of the ſails of *b*.

Draw up the ſlider again, and ſet the ſpring upon the pins as before; then cover the machine with the receiver M (fig. 8.) upon the pump-plate; and having exhauſted

---

(A) Such is the common conſtruction. But there is another invented by Mr Smeaton; by which a purer vacuum is obtained, and which alſo acts as a condenſing engine. There is, moreover, what they call a *portable air-pump*, which is placed on a table, and may be eaſily conveyed from one place to another. See the article (*Air*)-Pump.

Experiments.

ed the receiver of air, puſh down the wire PP (thro' the collar of leathers in the neck *q*) upon the ſlider; which will diſengage it from the pins, and allow the mills to turn round by the impulſe of the ſpring: and as there is no air in the receiver to make any ſenſible reſiſtance againſt them, they will both move a conſiderable time longer than they did in the open air; and the moment that one ſtops, the other will do ſo too.—This ſhows, that air reſiſts bodies in motion; and that equal bodies meet with different degrees of reſiſtance, according as they preſent greater or leſs ſurfaces to the air, in the planes of their motions.

11.

2. Take off the receiver M and the mills; and having put the guinea *a* and feather *b* upon the braſs flap *c*, turn up the flap, and ſhut it into the notch *d*. Then putting a wet leather over the top of the tall receiver AB (it being open both at top and bottom) cover it with the plate C, from which the guinea-and-feather tongs *e d* will then hang within the receiver. This done, pump the air out of the receiver, and then draw up the wire *f* a little, which by a ſquare piece on its lower end will open the tongs *ed*; and the flap falling down as at *c*, the guinea and feather will deſcend with equal velocities in the receiver, and both will fall upon the pump-plate at the ſame inſtant. *N. B.* In this experiment, the obſervers ought not to look at the top, but at the bottom, of the receiver, in order to ſee the guinea and feather fall upon the plate; otherwiſe, on account of the quickneſs of their motion, they will eſcape the ſight of the beholders.

v.
ſhow the
ght of
air.

1. Having fitted a braſs cap, with a valve tied over it, to the mouth of a thin bottle or Florence flaſk, whoſe contents are exactly known, ſcrew the neck of this cap into the hole *i* of the pump-plate; then having exhauſted the air out of the flaſk, and taken it off from the pump, let it be ſuſpended at one end of a balance, and nicely counterpoiſed by weights in the ſcale at the other end; this done, raiſe up the valve with a pin, and the air will ruſh into the flaſk with an audible noiſe: during which time, the flaſk will deſcend, and pull down that end of the beam. When the noiſe is over, put as many grains into the ſcale at the other end as will reſtore the equilibrium; and they will ſhew exactly the weight of the quantity of air which has got into the flaſk and filled it. If the flaſk holds an exact quart, it will be found, that 17 grains will reſtore the equipoiſe of the balance, when the quickſilver ſtands at 29½ inches in the barometer: which ſhows, that when the air is at a mean rate of denſity, a quart of it weighs 17 grains: it weighs more when the quickſilver ſtands higher, and leſs when it ſtands lower.

2. Place the ſmall receiver O (fig. 8.) over the hole *i* in the pump-plate; and upon exhauſting the air, the receiver will be fixed down to the plate by the preſſure of the air on its outſide, which is left to act alone, without any air in the receiver to act againſt it: and this preſſure will be equal to as many times 15 pounds as there are ſquare inches in that part of the plate which the receiver covers; which will hold down the receiver ſo faſt, that it cannot be got off until the air be let into it by turning the cock *k*; and then it becomes looſe.

2.

3. Set the little glaſs AB (which is open at both ends) over the hole *i* upon the pump-plate LL, and put your hand cloſe upon the top of it at B: then, upon exhauſting the air out of the glaſs, you will find your hand preſſed down with a great weight upon it; ſo that you can hardly releaſe it until the air be readmitted into the glaſs by turning the cock *k*; which air, by acting as ſtrongly upward againſt the hand as the external air acted in preſſing it downward, will releaſe the hand from its confinement.

Experiments.

4. Having tied a piece of wet bladder *b* over the open top of the glaſs A, (which is alſo open at bottom), ſet it to dry, and then the bladder will be tight like a drum. Then place the open end A upon the pump-plate over the hole *i*, and begin to exhauſt the air out of the glaſs. As the air is exhauſting, its ſpring in the glaſs will be weakened, and give way to the preſſure of the outward air on the bladder; which, as it is preſſed down, will put on a ſpherical concave figure, which will grow deeper and deeper, until the ſtrength of the bladder be overcome by the weight of the air; and then it will break with a report as loud as that of a gun.—If a flat piece of glaſs be laid upon the open top of this receiver, and joined to it by a flat ring of wet leather between them, upon pumping the air out of the receiver, the preſſure of the outward air upon the flat glaſs will break it all to pieces. Fig. 13.

5. Immerſe the neck *cd* of the hollow glaſs-ball *e b* in water, contained in the phial *a a*; then ſet it upon the pump-plate, and cover it and the hole *i* with the cloſe receiver A; and then begin to pump out the air. As the air goes out of the receiver by its ſpring, it will alſo by the ſame means go out of the hollow ball *e b*, through the neck *dc*, and riſe up in bubbles to the ſurface of the water in the phial; from whence it will make its way, with the reſt of the air in the receiver, through the air-pipe GG and valves *a* and *b*, into the open air. When it has done bubbling in the phial, the ball is ſufficiently exhauſted; and then, upon turning the cock *k*, the air will get into the receiver, and preſs ſo upon the ſurface of the water in the phial, as to force the water up into the ball in a jet, through the neck *c d*, and will fill the ball almoſt full of water. The reaſon why the ball is not quite filled, is becauſe all the air could not be taken out of it; and the ſmall quantity that was left in, and had expanded itſelf ſo as to fill the whole ball, is now condenſed into the ſame ſtate as the outward air, and remains in a ſmall bubble at the top of the ball, and ſo keeps the water from filling that part of the ball. Fig. 14.

6. Pour ſome quickſilver into the jar D, and ſet it on the pump-plate near the hole *i*; then ſet on the tall open receiver AB, ſo as to be over the jar and hole; and cover the receiver with the braſs-plate C. Screw the open glaſs tube *fg* (which has a braſs top on it at *h*) into the ſyringe H; and putting the tube through a hole in the middle of the plate, ſo as to immerſe the lower end of the tube *e* in the quickſilver at D, ſcrew the end *h* of the ſyringe into the plate. This done, draw up the piſton in the ſyringe by the ring I, which will make a vacuum in the ſyringe below the piſton; and as the upper end of the tube opens into the ſyringe, the air will be dilated in the tube, becauſe part of it by its ſpring gets up into the ſyringe; and the ſpring of the undilated air in the receiver acting upon the ſurface of the quickſilver in the Fig. 15.

Experiments.

jar, will force part of it up into the tube; for the quickſilver will follow the piſton in the ſyringe, in the ſame way, and for the ſame reaſon, that water follows the piſton of a common pump when it is raiſed in the pump-barrel; and this, according to ſome, is done by ſuction. But to refute that erroneous notion, let the air be pumped out of the receiver AB, and then all the quickſilver in the tube will fall down by its own weight into the jar, and cannot be again raiſed one hair's-breadth in the tube by working the ſyringe: which ſhows that ſuction had no hand in raiſing the quickſilver: and to prove that it is done by preſſure, let the air into the receiver by the cock *k* (fig. 8.), and its action upon the ſurface of the quickſilver in the jar will raiſe it up into the tube, although the piſton of the ſyringe continues motionleſs.—If the tube be about 32 or 33 inches high, the quickſilver will riſe in it very near as high as it ſtands at that time in the barometer. And if the ſyringe has a ſmall hole, as *m*, near the top of it, and the piſton be drawn up above that hole, the air will ruſh through the hole into the ſyringe and tube, and the quickſilver will immediately fall down into the jar. If this part of the apparatus be air-tight, the quickſilver may be pumped up into the tube to the ſame height that it ſtands in the barometer; but it will go no higher, becauſe then the weight of the column in the tube is the ſame as the weight of a column of air of the ſame thickneſs with the quickſilver, and reaching from the earth to the top of the atmoſphere.

Fig. 16. 7. Having placed the jar A, with ſome quickſilver in it, on the pump-plate, as in the laſt experiment, cover it with the receiver B; then puſh the open end of the glaſs tube *d e* through the collar of leathers in the braſs neck C (which it fits ſo as to be air-tight) almoſt down to the quickſilver in the jar. Then exhauſt the air out of the receiver, and it will alſo come out of the tube, becauſe the tube is cloſe at top. When the gauge *m m* ſhews that the receiver is well exhauſted, puſh down the tube ſo as to immerſe its lower end into the quickſilver in the jar. Now, although the tube be exhauſted of air, none of the quickſilver will riſe into it, becauſe there is no air left in the receiver to preſs upon its ſurface in the jar: but let the air into the receiver by the cock *k*, and the quickſilver will immediately riſe in the tube, and ſtand as high in it as it was pumped up in the laſt experiment.

Both theſe experiments ſhow, that the quickſilver is ſupported in the barometer by the preſſure of the air on its ſurface in the box, in which the open end of the tube is placed: And that the more denſe and heavy the air is, the higher does the quickſilver riſe; and, on the contrary, the thinner and lighter the air is, the more will the quickſilver fall. For if the handle F be turned ever ſo little, it takes ſome air out of the receiver, by raiſing one or other of the piſtons in its barrel; and conſequently, that which remains in the receiver is ſo much the rarer, and has ſo much the leſs ſpring and weight; and thereupon the quickſilver falls a little in the tube: but upon turning the cock, and re-admitting the air into the receiver, it becomes as weighty as before, and the quick-ſilver riſes again to the ſame height.——Thus we ſee the reaſon why the quickſilver in the barometer falls before rain or ſnow, and riſes before fair weather; for, in the former caſe, the air is too thin and light to bear up the vapours, and in the latter, too denſe and heavy to let them fall.

Experiments.

[*N. B.* In all mercurial experiments with the air-pump, a ſhort pipe muſt be ſcrewed into the hole *i*, ſo as to riſe about an inch above the plate, to prevent the quickſilver from getting into the air-pipe and barrels, in caſe any of it ſhould be accidentally ſpilt over the jar: for if it once gets into the pipes or barrels, it ſpoils them, by looſening the ſolder, and corroding the braſs.]

8. Take the tube out of the receiver, and put one end of a bit of dry hazel-branch, about an inch long, tight into the hole, and the other end tight into a hole quite through the bottom of a ſmall wooden cup: then pour ſome quickſilver into the cup, and exhauſt the receiver of air; and the preſſure of the outward air on the ſurface of the quickſilver will force it through the pores of the hazel, from whence it will deſcend in a beautiful ſhower into a cup placed under the receiver to catch it.

9. Put a wire through the collar of leathers in the top of the receiver, and fit a bit of dry wood on the end of the wire within the receiver; then exhauſt the air, and puſh the wire down, ſo as to immerſe the wood into a jar of quickſilver on the pump-plate. This done, let in the air; and upon taking the wood out of the jar, and ſplitting it, its pores will be found full of quickſilver, which the force of the air, upon being let into the receiver, drove into the wood.

10. Join the two braſs hemiſpherical cups A and B together, with a wet leather between them, having a hole in the middle of it; then ſcrew the end D of the pipe CD into the plate of the pump at *i*, and turn the cock E, ſo as the pipe may be open all the way into the cavity of the hemiſpheres: then exhauſt the air out of them, and turn the cock a quarter round, which will ſhut the pipe CD, and keep out the air. This done, unſcrew the pipe at D from the pump; and ſcrew the the piece F*h* upon it at D; and let two ſtrong men try to pull the hemiſpheres aſunder by the rings *g* and *h*, which they will find hard to do: for if the diameter of the hemiſpheres be four inches, they will be preſſed together by the external air with a force equal to 188 pounds. And to ſhew that it is the preſſure of the air that keeps them together, hang them by either of the rings upon the hook P of the wire in the receiver M (fig. 8,), and upon exhauſting the air out of the receiver they will fall aſunder of themſelves. Fig. 17.

11. Place a ſmall receiver O (fig. 8.) near the hole *i* on the pump-plate, and cover both it and the hole with the receiver M; and turn the wire ſo by the top P, that its hook may take hold of the little receiver by a ring at its top, allowing that receiver to ſtand with its own weight on the plate. Then, upon working the pump, the air will come out of both receivers; but the large one M will be forcibly held down to the pump by the preſſure of the external air; whilſt the ſmall one O, having no air to preſs upon it, will continue looſe, and may be drawn up and let down at pleaſure, by the wire PP. But, upon letting it quite down to the plate, and admitting the air into the receiver M, by the cock *k*, the air will preſs ſo ſtrongly upon the ſmall receiver O, as to fix it down to the plate; and at the ſame time, by counterbalancing the outward preſſure on the large receiver M, it will become looſe. This experiment

ment evidently ſhows, that the receivers are held down by preſſure, and not by ſuction: for the internal receiver continued looſe whilſt the operator was pumping, and the external one was held down; but the former became faſt immediately by letting in the air upon it.

Fig. 18. 12. Screw the end A of the braſs pipe ABF into the hole of the pump-plate, and turn the cock *e* until the pipe be open; then put a wet leather upon the plate *cd*, which is fixed on the pipe, and cover it with the tall receiver GH, which is cloſe at top: then exhauſt the air out of the receiver, and turn the cock *e* to keep it out; which done, unſcrew the pipe from the pump, and ſet its end A into a baſon of water, and turn the cock *e* to open the pipe; on which, as there is no air in the receiver, the preſſure of the atmoſphere on the water in the baſon will drive the water forcibly through the pipe, and make it play up in a jet to the top of the receiver.

13. Set the ſquare phial A (fig. 21.) upon the pump-plate, and having covered it with the wire-cage B, put a cloſe receiver over it, and exhauſt the air out of the receiver; in doing of which, the air will alſo make its way out of the phial through a ſmall hole in its neck under the valve *b*. When the air is exhauſted, turn the cock below the plate, to re-admit the air into the receiver; and as it cannot get into the phial again becauſe of the valve, the phial will be broken into ſome thouſands of pieces by the preſſure of the air upon it. Had the phial been of a round form, it would have ſuſtained this preſſure like an arch, without breaking; but as its ſides are flat, it cannot.

vi. To ſhow the elaſticity or ſpring of the air.

14. Tie up a very ſmall quantity of air in a bladder, and put it under a receiver; then exhauſt the air out of the receiver; and the ſmall quantity which is confined in the bladder (having nothing to act againſt it) will expand itſelf ſo by the force of its ſpring, as to fill the bladder as full as it could be blown of common air. But upon letting the air into the receiver again, it will overpower the air in the bladder, and preſs its ſides almoſt cloſe together.

15. If the bladder ſo tied up be put into a wooden box, and have 20 or 30 pounds weight of lead put upon it in the box, and the box be covered with a cloſe receiver; upon exhauſting the air out of the receiver, that air which is confined in the bladder will expand itſelf ſo, as to raiſe up all the lead by the force of its ſpring.

ig. 14. 16. Take the glaſs ball mentioned in the fifth experiment, which was left full of water all but a ſmall bubble of air at top; and having ſet it with its neck downward into the empty phial *aa*, and covered it with a cloſe receiver, exhauſt the air out of the receiver; and the ſmall bubble of air in the top of the ball will expand itſelf ſo as to force all the water out of the ball into the phial.

ig. 18. 17. Screw the pipe AB into the pump-plate; place the tall receiver GH upon the plate *cd*, as in the 12th experiment; and exhauſt the air out of the receiver: then turn the cock *e* to keep out the air, unſcrew the pipe from the pump, and ſcrew it into the mouth of the copper veſſel CC (fig. 22.), the veſſel having firſt been about half filled with water. Then open the cock *e*, (fig. 18.); and the ſpring of the air which is confined in the copper veſſel will force the water up through the pipe AB in a jet into the exhauſted receiver, as ſtrongly as it did by its preſſure on the ſurface of the water in a baſon, in the 12th experiment.

18. If a fowl, a cat, rat, mouſe, or bird, be put under a receiver, and the air be exhauſted, the animal will be at firſt oppreſſed as with a great weight, then grow convulſed, and at laſt expire in all the agonies of a moſt bitter and cruel death. But as this experiment is too ſhocking to every ſpectator who has the leaſt degree of humanity, ſome ſubſtitute a machine called the *lungs-glaſs* in place of the animal.

19. If a butterfly be ſuſpended in a receiver by a fine thread tied to one of its horns, it will fly about in the receiver as long as the receiver continues full of air; but if the air be exhauſted, though the animal will not die, and will continue to flutter its wings, it cannot remove itſelf from the place where it hangs in the middle of the receiver until the air be let in again; and then the animal will fly about as before.

20. Pour ſome quickſilver into the ſmall bottle A, Fig. 19. and ſcrew the braſs collar *c* of the tube BC into the braſs neck *b* of the bottle, and the lower end of the tube will be immerſed into the quickſilver, ſo that the air above the quickſilver in the bottle will be confined there, becauſe it cannot get out about the joinings, nor can it be drawn out through the quickſilver into the tube. This tube is alſo open at top, and is to be covered with the receiver G and large tube EF; which tube is fixed by braſs collars to the receiver, and is cloſe at the top. This preparation being made, exhauſt the air both out of the receiver and its tube; and the air will by the ſame means be exhauſted out of the inner tube BC, through its open top at C; and as the receiver and tubes are exhauſting, the air that is confined in the glaſs bottle A will preſs ſo by its ſpring upon the ſurface of the quickſilver, as to force it up in the inner tube as high as it was raiſed in the ninth experiment by the preſſure of the atmoſphere: which demonſtrates, that the ſpring of the air is equivalent to its weight.

21. Screw the end C of the pipe CD into the hole Fig. 20. of the pump-plate, and turn all the three cocks *d*, G, and H, ſo as to open the communications between all the three pipes E, F, DC, and the hollow trunk AB. Then cover the plates *g* and *h* with wet leathers, which have holes in their middle where the pipes open into the plates; and place the cloſe receiver I upon the plate G: this done, ſhut the pipe F by turning the cock H, and exhauſt the air out of the receiver I. Then turn the cock *d* to ſhut out the air, unſcrew the machine from the pump, and having ſcrewed it to the wooden foot L, put the receiver K upon the plate *h*; this receiver will continue looſe on the plate as long as it keeps full of air; which it will do until the cock H be turned to open the communication between the pipes F and E, through the trunk AB; and then the air in the receiver K, having nothing to act againſt its ſpring, will run from K into I, until it be ſo divided between theſe receivers as to be of equal denſity in both; and then they will be held down with equal forces to their plates by the preſſure of the atmoſphere, though each receiver will then be kept down but with one half of preſſure upon it that the receiver I had when it was exhauſted of air; becauſe it has now one half of the common air in it which filled the receiver K when it was ſet upon the plate; and therefore, a force equal to

half the force of the ſpring of common air, will act within the receivers againſt the whole preſſure of the common air upon their outſides. This is called *transferring the air out of one veſſel into another*.

Fig. 21.

22. Put a cork into the ſquare phial A, and fix it in with wax or cement; put the phial upon the pump-plate with the wire cage B over it, and cover the cage with a cloſe receiver. Then exhauſt the air out of the receiver; and the air that was corked up in the phial will break the phial outwards by the force of its ſpring, becauſe there is no air left on the outſide of the phial to act againſt the air within it.

23. Put a ſhrivelled apple under a cloſe receiver, and exhauſt the air; then the ſpring of the air within the apple will plump it out, ſo as to cauſe all the wrinkles diſappear; but upon letting the air into the receiver again to preſs upon the apple, it will inſtantly return to its former decayed and ſhrivelled ſtate.

24. Take a freſh egg, and cut off a little of the ſhell and film from its ſmalleſt end; then put the egg under a receiver, and pump out the air; upon which all the contents in the egg will be forced out into the receiver by the expanſion of a ſmall bubble of air contained in the great end between the ſhell and film.

25. Put ſome warm beer in a glaſs; and having ſet it on the pump, cover it with a cloſe receiver, and then exhauſt the air. Whilſt this is doing, and thereby the preſſure more and more taken off from the beer in the glaſs, the air therein will expand itſelf, and riſe up in innumerable bubbles to the ſurface of the beer; and from thence it will be taken away with the other air in the receiver. When the receiver is nearly exhauſted, the air in the beer, which could not diſentangle itſelf quick enough to get off with the reſt, will now expand itſelf ſo, as to cauſe the beer to have all the appearance of boiling; and the greateſt part of it will go over the glaſs.

26. Put ſome warm water in a glaſs, and put a bit of dry wainſcot or other wood into the water. Then cover the glaſs with a cloſe receiver, and exhauſt the air; upon which the air in the wood, having liberty to expand itſelf, will come out plentifully, and make all the water to bubble about the wood, eſpecially about the ends, becauſe the pores lie lengthwiſe. A cubic inch of dry wainſcot has ſo much air in it, that it will continue bubbling for near half an hour together.

vii. Miſcellaneous experiments.

27. Screw the ſyringe H (fig. 15.) to a piece of lead that weighs one pound at leaſt; and holding the lead in one hand, pull up the piſton in the ſyringe with the other; then quitting hold of the lead, the air will puſh it upward, and drive back the ſyringe upon the piſton. The reaſon of this is, that the drawing up of the piſton makes a vacuum in the ſyringe; and the air, which preſſes every way equally, having nothing to reſiſt its preſſure upward, the lead is thereby preſſed upward contrary to its natural tendency by gravity. If the ſyringe ſo loaded be hung in a receiver, and the air be exhauſted, the ſyringe and lead will deſcend upon the piſton-rod by their natural gravity; and upon admitting the air into the receiver, they will be drove upward again until the piſton be at the very bottom of the ſyringe.

28. Let a large piece of cork be ſuſpended by a thread at one end of a balance, and counterpoiſed by a leaden weight, ſuſpended in the ſame manner, at the other Let this balance be hung to the inſide of the top of a large receiver; which being ſet on the pump, and the air exhauſted, the cork will preponderate, and ſhow itſelf to be heavier than the lead; but upon letting in the air again, the equilibrium will be reſtored. The reaſon of this is, that ſince the air is a fluid, and all bodies loſe as much of their abſolute weight in it as is equal to the weight of their bulk of the fluid, the cork being the larger body, loſes more of its real weight than the lead does; and therefore muſt in fact be heavier, to balance it under the diſadvantage of loſing ſome of its weight: which diſadvantage being taken off by removing the air, the bodies then gravitate according to their real quantities of matter, and the cork, which balanced the lead in air, ſhows itſelf to be heavier when *in vacuo*.

29. Set a lighted candle upon the pump, and cover it with a tall receiver. If the receiver holds a gallon, the candle will burn a minute; and then, after having gradually decayed from the firſt inſtant, it will go out: which ſhews, that a conſtant ſupply of freſh air is neceſſary to feed flame; and ſo it alſo is for animal-life. For a bird kept under a cloſe receiver will ſoon die, although no air be pumped out; and it is found that, in the diving-bell, a gallon of air is ſufficient only for one minute for a man to breathe in.

The moment when the candle goes out, the ſmoke will be ſeen to aſcend to the top of the receiver, and there it will form a ſort of cloud: but upon exhauſting the air, the ſmoke will fall down to the bottom of the receiver, and leave it as clear at the top as it was before it was ſet upon the pump. This ſhows, that ſmoke does not aſcend on account of its being poſitively light, but becauſe it is lighter than air; and its falling to the bottom when the air was taken away, ſhows that it is not deſtitute of weight. So moſt ſorts wood aſcend or ſwim in water; and yet there are none who doubt of the wood's having gravity or weight.

30. Set a receiver, which is open at top, upon the air-pump, and cover it with a braſs plate and wet leather; and having exhauſted it of air, let the air in again at top through an iron pipe, making it paſs thro' a charcoal flame at the end of the pipe; and when the receiver is full of that air, lift up the cover and let down a mouſe or bird into the receiver, and the burnt air will immediately kill it. If a candle be let down into the air, it will go out directly; but by letting it down gently, it will purify the air ſo far as it goes; and ſo, by letting it down more and more, all the air in the receiver will be purified.

31. Set a bell upon a cuſhion on the pump-plate, and cover it with a receiver; then ſhake the pump to make the clapper ſtrike againſt the bell, and the ſound will be very well heard: but exhauſt the receiver of air, and then, if the clapper be made to ſtrike ever ſo hard againſt the bell, it will make no ſound at all; which ſhows that air is abſolutely neceſſary for the propagation of ſound.

32. Let a candle be placed on one ſide of a receiver, and viewed through the receiver at ſome diſtance; then, as ſoon as the air begins to be exhauſted, the receiver will be filled with vapours which riſe from the wet leather, by the ſpring of the air in it; and the light of the candle being refracted through that medium of vapours,

Experiments.

vapours, will have the appearance of circles of various colours, of a faint reſemblance to thoſe in the rain-bow.

The elaſtic air which is contained in many bodies, and is kept in them by the weight of the atmoſphere, may be got out of them either by boiling, or by the air-pump, as ſhewn in the 25th experiment: but the fixed air, which is by much the greater quantity, cannot be got out but by diſtillation, fermentation, or putrefaction.

If fixed air did not come out of bodies with difficulty, and ſpend ſome time in extricating itſelf from them, it would tear them to pieces. Trees would be rent by the change of air from a fixed to an elaſtic ſtate, and animals would be burſt in pieces by the exploſion of air in their food.

Dr Hales found by experiment, that the air in apples is ſo much condenſed, that if it were let out into the common air, it would fill a ſpace 48 times as great as the bulk of the apples themſelves; ſo that its preſſure outwards was equal to 11,776 lb. and, in a cubic inch of oak, to 19,860 lb. againſt its ſides. So that if the air was let looſe at once in theſe ſubſtances, they would tear every thing to pieces about them with a force ſuperior to that of gunpowder. Hence, in eating apples, it is well that they part with the air by degrees as they are chewed and ferment in the ſtomach, otherwiſe an apple would be immediate death to him who eats it.

The mixing of ſome ſubſtances with others will releaſe the air from them, all of a ſudden; which may be attended with very great danger. Of this we have a remarkable inſtance in an experiment made by Dr Slare; who having put half a dram of oil of carraway-ſeeds into one glaſs, and a dram of compound ſpirit of nitre in another, covered them both on the air-pump with a receiver ſix inches wide and eight inches deep, and then exhauſted the air, and continued pumping until all that could poſſibly be got both out of the receiver, and out of the two fluids, was extricated: then, by a particular contrivance from the top of the receiver, he mixed the fluids together; upon which they produced ſuch a prodigious quantity of air as inſtantly blew up the receiver, although it was preſſed down by the atmoſphere with upwards of 400 pound weight.

Pneumonics.

PNEUMONICS, in pharmacy, medicines proper in diſeaſes of the lungs, in which reſpiration is affected.

PO, a large and celebrated river of Italy, which has its ſource at mount Viſo in Piedmont, and on the confines of Dauphiny. It runs through Piedmont, Montferrat, the Milaneſe, and duchy of Mantua; from thence it runs to the borders of the Parmezan, and a part of the Modeneſe; and having entered the Ferrareſe, it begins to divide at Ficheruolo, and proceeds to diſcharge itſelf into the gulf of Venice by four principal mouths. As it paſſes along, it receives ſeveral rivers, and often overflows its banks, doing a great deal of miſchief; the reaſon of which is, that moſt of thoſe rivers deſcend from the Alps, and are increaſed by the melting of the ſnow.

POA, MEADOW-GRASS; a genus of the digynia order, belonging to the pentandria claſs of plants. There are 20 ſpecies; moſt of them graſſes, and very agreeable food for cattle; for one ſpecies which grows in marſhes, the cattle will frequently go ſo deep as to endanger their lives. This is called the *aquatica*, or *water reed-graſs*. It is the largeſt of the Britiſh graſſes, growing to the height of five or ſix feet. The leaves are ſmooth, and half an inch wide, or more. The panicle is eight or ten inches long, greatly branched, and decked with numerous ſpicula: theſe are of a reddiſh-brown colour intermixed with green, of a compreſſed lanceolate form, imbricated with about ſix flowers for the moſt part, but varying from five to ten.

Pocock.

POCOCK (Dr Edward), one of the moſt learned men in the oriental tongues in Europe, was the eldeſt ſon of the Rev. Mr Edward Pocock; and was born at Oxford in 1604, where he was alſo bred. In 1628, he was admitted probationer fellow of his college, and about the ſame time had prepared an edition of the Second Epiſtle of St Peter, the Second and Third of St John, and that of St Jude, in Syriac and Greek, with a Latin Tranſlation and Notes. In 1629, he was ordained prieſt, and appointed chaplain to the Engliſh merchants at Aleppo, where he continued five or ſix years; in which time he diſtinguiſhed himſelf by his fortitude and zeal while the plague raged there. At length returning to England, he was, in 1636, appointed reader of the Arabic lectures founded by archbiſhop Laud. Three years after, he went to Conſtantinople, where he proſecuted his ſtudies of the Eaſtern tongues, and procured many valuable manuſcripts. After near four years ſtay in that city, he embarked in 1640; and taking Paris in his way, viſited Gabriel Sionita the famous Maronite, and Hugo Grotius. In 1643, he was preſented to the rectory of Childrey in Berks; and, about three years after, married the daughter of Thomas Burdett, Eſq. About the middle of 1647, he obtained the reſtitution of the ſalary of his Arabic lecture, which had been detained from him about three years. In 1648, king Charles I. who was then priſoner in the iſle of Wight, nominated Mr Pocock to the profeſſorſhip of Hebrew, and the canonry of Chriſt-church annexed to it; but, in 1650, he was ejected from his canonry for refuſing to take the engagement, and ſoon after a vote paſſed for depriving him of his Hebrew and Arabic lectures; but ſeveral governors of houſes, &c. preſenting a petition in his favour, he was ſuffered to enjoy both thoſe places. He had ſome years before publiſhed his *Specimen Hiſtoriæ Arabum*; and now appeared his *Porta Moſis*; and ſoon after, the Engliſh Polyglot edition of the Bible, to which he had largely contributed, and alſo Eutychius's Annals, with a Latin verſion. At the Reſtoration, he was reſtored to the canonry of Chriſt-church, and alſo received the degree of doctor of divinity. He then publiſhed his Arabic Verſion of Grotius's Treatiſe of the Truth of the Chriſtian Religion; and an Arabic Poem, intitled *Lamiato'l Ajam*, with a Latin Tranſlation and Notes. Soon after, he publiſhed Gregory Abul Pharajius's *Hiſtoria Dynaſtiarum*.

tiarum. In 1674, he publiſhed an Arabic Verſion of the chief parts of the Liturgy of the church of England; and a few years after his Commentary on the Prophecies of Micah, Malachi, Hoſea, and Joel. This great man died in 1691, after having been for many years confeſſedly the firſt perſon in Europe for eaſtern learning; and was no leſs worthy of admiration for his uncommon modeſty and humility, and all the virtues that can adorn a Chriſtian. His theological works were republiſhed at London in 1740, in two volumes in folio.

PODOLIA, a province of Poland, bounded on the eaſt by Volhinia and the river Ukrain; on the north and north-eaſt, by Budſiac Tartary; on the ſouth-eaſt, by the river Nieſter, which ſeparates it from Beſſarabia and Moldavia in European Turkey on the ſouth-weſt; and by the province of Red Ruſſia, on the north-weſt. It is uſually divided into the Upper and Lower: in the Upper, which is the weſtern part, the chief town is Kamieck, the capital of Podolia, and of a palatinate. In the Lower, or eaſtern part of Podolia, the chief town is Brackow, the capital of a palatinate.

PODEX, in anatomy. The ſame with Anus.

POEM, a poetical compoſition. See Poetry.

POESTUM, or Posidonia, an ancient city of Grecia Magna, now part of the kingdom of Naples. It has long ſince been in ruins, and theſe ruins only became known in the following manner, according to the account publiſhed by the author of the *Antiquities, Hiſtory, and views, of Poeſtum.* "In the year 1755, an apprentice to a painter at Naples, who was on a viſit to his friends at Capaccio, by accident took a walk to the mountains which ſurround the territory of Poeſtum. The only habitation he perceived was the cottage of a farmer, who cultivated the beſt part of the ground, and reſerved the reſt for paſture. The ruins of the ancient city made a part of this view, and particularly ſtruck the eyes of the young painter; who, approaching nearer, ſaw with aſtoniſhment walls, towers, gates, and temples. Upon his return to Capaccio, he conſulted the neighbouring people about the origin of theſe monuments of antiquity. He could only learn, that this part of the country had been uncultivated and abandoned during their memory; that about ten years before, the farmer, whoſe habitation he had noticed, eſtabliſhed himſelf there; and that having dug in many places and ſearched among the ruins that lay round him, he had found treaſures ſufficient to enable him to purchaſe the whole. At the painter's return to Naples, he informed his maſter of theſe particulars, whoſe curioſity was ſo greatly excited by the deſcription, that he took a journey to the place, and made drawings of the principal views. Theſe were ſhown to the king of Naples, who ordered the ruins to be cleared, and Poeſtum aroſe from the obſcurity in which it had remained for upwards of 700 years, as little known to the neighbouring inhabitants as to travellers."

Our author gives the following deſcription of it in its preſent ſtate. It is, ſays he, of an oblong figure, about two miles and a half in circumference. It has four gates which are oppoſite to each other. On the key-ſtone of the arch of the north-gate, on the outſide, is the figure of Neptune in baſſo relievo, and within a hippocampus. The walls which ſtill remain are compoſed of very large cubical ſtones, and are extremely thick, in ſome parts 18 feet. That the walls have remained unto this time, is owing to the very exact manner in which the ſtones are fitted to one another, (a circumſtance obſerved univerſally in the maſonry of the ancients), and perhaps, in ſome meaſure, to a ſtalactical concretion which has grown over them. On the walls here and there are placed towers of different heights, thoſe near the gates being much higher and larger than the others, and evidently of modern workmanſhip. He obſerves, that, from its ſituation among marches, bituminous and ſulphureous ſprings, Poeſtum muſt have been unwholeſome; a circumſtance mentioned by Strabo, *Morboſam eam facit fluvius in paludes diffuſus.* In ſuch a ſituation the water muſt have been bad. Hence the inhabitants were obliged to convey that neceſſary of life from purer ſprings by means of aqueducts, of which many veſtiges ſtill remain.

The principal monuments of antiquity are a theatre, an amphitheatre, and three temples. The theatres and amphitheatres are much ruined. The firſt temple is hexaſtylos, and amphiproſtylos. At one end, the pilaſters and two columns which divided the cella from the pronaos are ſtill remaining. Within the cella are two rows of ſmaller columns, with an architrave, which ſupport the ſecond order. This temple he takes to be of that kind called by Vitruvius *hyphæthros*, and ſupports his opinion by a quotation from that author. The ſecond temple is alſo amphiproſtylos: it has nine columns in front and 18 in flank, and ſeems to be of that kind called by Vitruvius *pſeudodipteros*. The third is likewiſe amphiproſtylos. It has ſix columns in front and 13 in flank. Vitruvius calls this kind of temple *peripteros*. "The columns of theſe temples (ſays our author), are of that kind of Doric order which we find employed in works of the greateſt antiquity. They are hardly five diameters in height. They are without baſes, which alſo has been urged as a proof of their antiquity; but we do not find that the ancients ever uſed baſes to this order, at leaſt till very late. Vitruvius makes no mention of baſes for this order: and the only inſtance we have of it, is in the firſt order of the coliſæum at Rome, which was built by Veſpaſian. The pillars of theſe temples are fluted with very ſhallow flutings in the manner deſcribed by Vitruvius. The columns diminiſh from the bottom, which was the moſt ancient method almoſt univerſally in all the orders. The columns have aſtragals of a very ſingular form; which ſhows the error of thoſe who imagine that this member was firſt invented with the Ionic order, to which the Greeks gave an aſtragal, and that the Romans were the firſt who applied it to the Doric. The echinus of the capital is of the ſame form with that of the temple of Corinth deſcribed by Le Roy."

POET, the author of a poem. See the next article.

Fig. 1. PROCELLARIA Pelagica or Petrel.

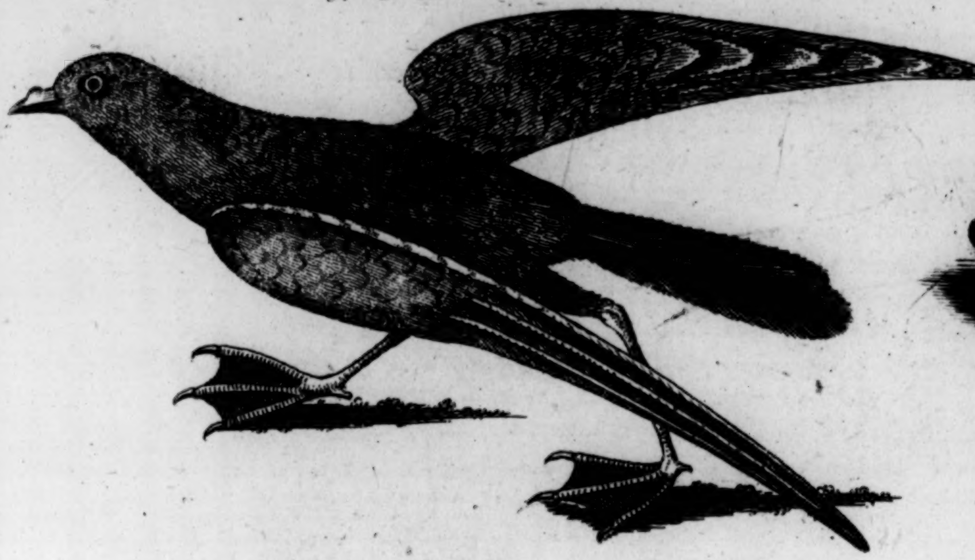
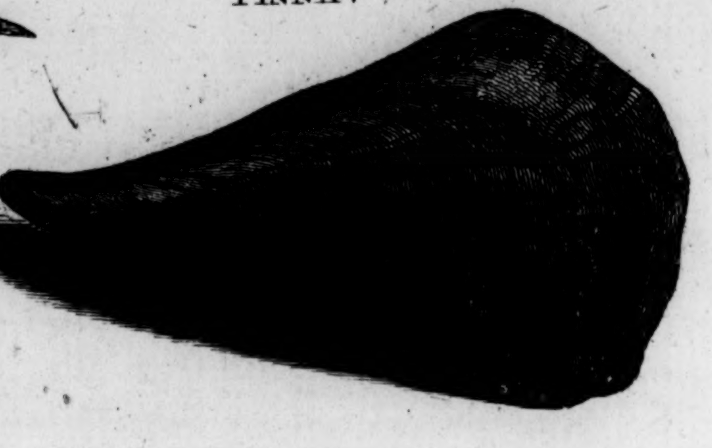


Fig. 2. PINNA.



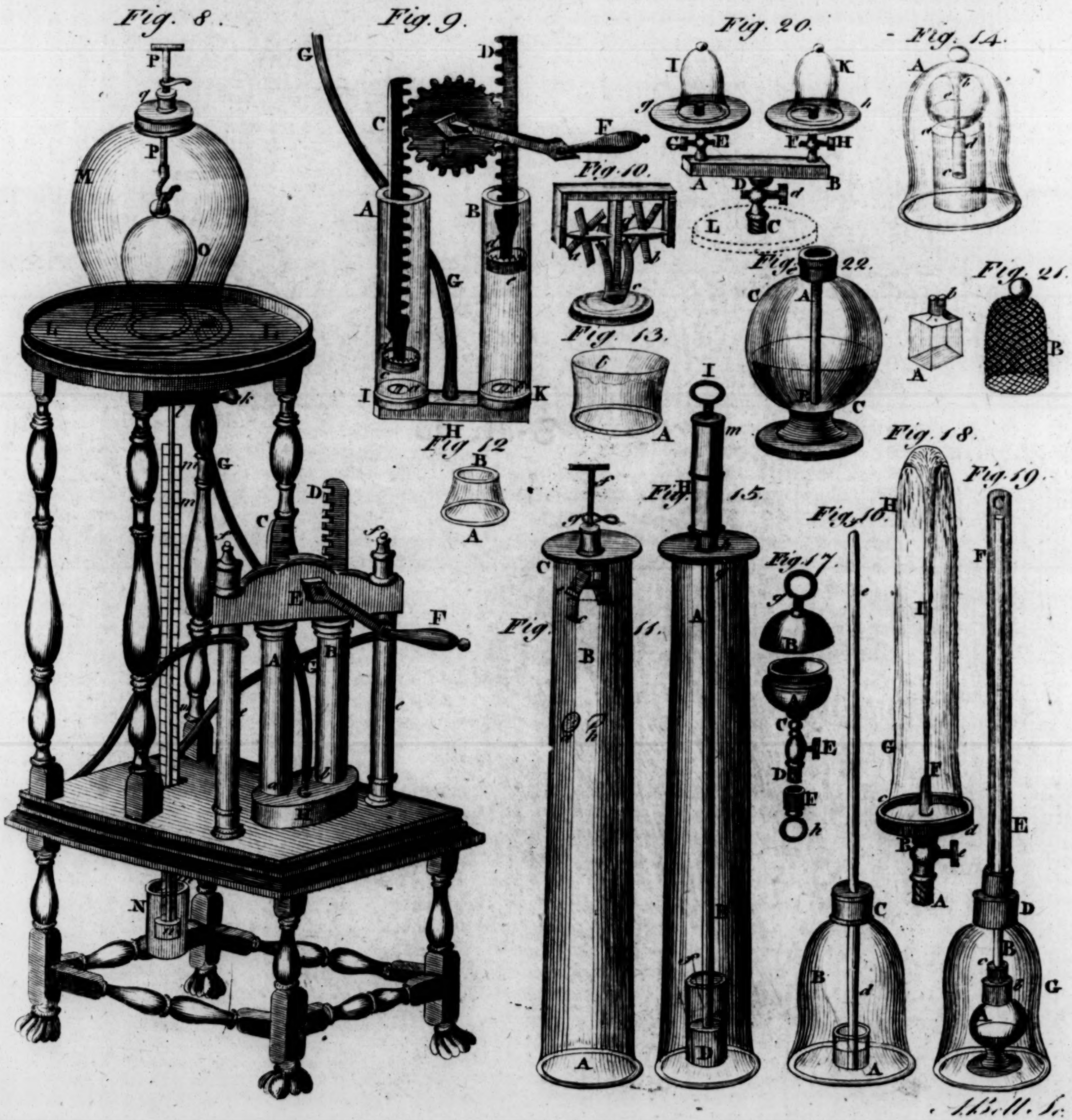


Fig. 8.

P
q
p
M
O
L
L
k
G
m
m
D
C
E
F
A
B
N
m

Fig. 9.

G
D
C
E
A
B
G
I
K
H

Fig. 20.

I
K
g
h
G
E
F
H
A
D
B
d
L
C

Fig. 14.

A

Fig. 10.

Fig. 22.

C
A
B
C
m

Fig. 21.

A
B

Fig. 13.

A

Fig. 12.

B
A

Fig. 18.

H
I
F
G
c
d
B
A

Fig. 19.

C
F
E
D
B
G

Fig. 15.

I
H
A
B
D

Fig. 16.

e
C
B
d
A

Fig. 17.

g
B
A
C
E
D
F
h

Fig. 11.

C
B
h
A

J. Bell. Sc.

3 MA 53

POETRY.

1 AMIDST thoſe thick clouds which evelope the firſt ages of the world, reaſon and hiſtory throw ſome lights on the origin and primitive employment of this divine art. Reaſon ſuggeſts, that before the invention of letters, all the people of the earth had no other method of tranſmitting to their deſcendents the principles of their worſhip, their religious ceremonies, their laws, and the renowned actions of their ſages and heroes, than by poetry; which included all theſe objects in a kind of hymns that fathers ſung to their children, in order to engrave them with indelible ſtrokes in their hearts. Hiſtory not only informs us, that Moſes and Miriam, the firſt authors that are known to mankind, ſung, on the borders of the Red Sea, a ſong of divine praiſe, to celebrate the deliverance which the Almighty had vouchſafed to the people of Iſrael, by opening a paſſage to them through the waters; but it has alſo tranſmitted to us the ſong itſelf, which is at once the moſt ancient monument and a maſter-piece of poetic compoſition.

2. The Greeks, a people the moſt ingenious, the moſt animated, and in every ſenſe the moſt accompliſhed, that the world ever produced—ſtrove to raviſh from the Hebrews the precious gift of poetry, which was vouchſafed them by the Supreme Author of all nature, that they might aſcribe it to their falſe deities. According to their ingenious fictions, Apollo became the god of poetry, and dwelt on the hills of Phocis, Parnaſſus, and Helicon, whoſe feet were waſhed by the waters of Hyppocrene, of which each mortal that ever drank was ſeized with a ſacred delirium. The immortal ſwans floated on its waves. Apollo was accompanied by the Muſes—thoſe nine learned ſiſters—the daughters of Memory: and he was conſtantly attended by the Graces. Pegaſus, his winged courſer, tranſported him with a rapid flight into all the regions of the univerſe. Happy emblems! by which we at this day embelliſh our poetry, as no one has ever yet been able to invent more brilliant images.

3. The literary annals of all nations afford veſtiges of poetry, from the remoteſt ages. They are found among the moſt ſavage of the ancient barbarians, and the moſt deſolate of all the Americans. Nature aſſerts her rights in every country, and every age. Tacitus mentions the verſes and the hymns af the Germans, at the time when that rough people yet inhabited the woods, and while their manners were ſtill ſavage. The firſt inhabitants of Runnia, and the other northern countries, thoſe of Gaul, Albion, Iberia, Auſonia, and other nations of Europe, had their poetry, as well as the ancient people of Aſia, and of the known borders of Africa. But the ſimple productions of nature have conſtantly ſomething unformed, rough, and ſavage. The Divine Wiſdom appears to have placed the ingenious and poliſhed part of mankind on the earth, in order to refine that which comes from her boſom rude and imperfect: and thus art has poliſhed poetry, which iſſued quite naked and ſavage from the brains of the firſt of mankind.

4. But what is Poetry? It would be to abridge the limits of the poetic empire, to contract the ſphere of this divine art, ſhould we ſay, in imitation of all the dictionaries and other treatiſes on verſification, That *poetry is the art of making verſes, of lines or periods that are in rhyme or metre.* This is rather a grammatical explanation of the word, than a real definition of the thing, and it would be to degrade poetry thus to define it. The juſteſt definition ſeems to be that given by Baron Bielfield †, That *poetry is the art of expreſſing our thoughts by fiction.* In fact, it is after this manner (if we reflect with attention) that all the metaphors and allegories, all the various kinds of fiction, form the firſt materials of a poetic edifice: it is thus that all images, all compariſons, illuſions, and figures, eſpecially thoſe which perſonify moral ſubjects, as virtues and vices, concur to the decorating of ſuch a ſtructure. A work, therefore, that is filled with invention, that inceſſantly preſents images which render the reader attentive and affected, where the author gives intereſting ſentiments to every thing that he makes ſpeak, and where he makes ſpeak by ſenſible figures all thoſe objects which would affect the mind but weakly when clothed in a ſimple proſaic ſtyle, ſuch a work is a poem. While that, though it be in verſe, which is of a didactic, dogmatic, or moral nature, and where the objects are preſented in a manner quite ſimple, without fiction, without images or ornaments, cannot be called *poetry*, but merely a work in verſe; for the art of reducing thoughts, maxims, and periods, into ryme or metre, is very different from the art of poetry.

6. An ingenious fable, a lively and intereſting romance, a comedy, the ſublime narrative of the actions of a hero, ſuch as the Telemachus of M. Fenelon, though written in proſe, but in meaſured proſe, is therefore a work of poetry: becauſe the foundation and the ſuperſtructure are the productions of genius, as the whole proceeds from fiction; and truth itſelf appears to have employed an innocent and agreeable deception to inſtruct with efficacy. This is ſo true, that the pencil alſo, in order to pleaſe and affect, has recourſe to fiction; and this part of painting is called the *poetic compoſition of a picture.* It is therefore by the aid of fiction that poetry, ſo to ſpeak, paints its expreſſions, that it gives a body and a mind to its thoughts, that it animates and exalts that which would otherwiſe have remained arid and inſenſible. Every work, therefore, where the thoughts are expreſſed by fictions or images, is poetic; and every work where they are expreſſed naturally, ſimply, and without ornament, although it be in verſe, is proſaic.

7. Verſe, however, is not to be regarded as foreign or ſuperfluous to poetry. To reduce thoſe images, thoſe fictions, into verſe, is one of the greateſt difficulties in poetry, and one of the greateſt merits in a poem: and for theſe reaſons, the cadence, the harmony of ſounds, particularly that of rhyme, delight the ear to a high degree, and the mind inſenſibly repeats them while the eye reads them. There reſults therefore a

---

† *Elem. of Univ. Erud.*

pleaſure to the mind, and a ſtrong attachment to theſe ornaments: but this pleaſure would be frivolous, and even childiſh, if it were not attended by a real utility. Verſes were invented in the firſt ages of the world, merely to aid and to ſtrengthen the memory: for cadence, harmony, and eſpecially rhyme, afford the greateſt aſſiſtance to the memory that art can invent; and the images, or poetic fictions, that ſtrike our ſenſes, aſſiſt in graving them with ſuch deep traces in our minds, as even time itſelf frequently cannot efface. How many excellent apophthegms, ſentences, maxims, and precepts, would have been buried in the abyſs of obligion, if poetry had not preſerved them by its harmony? To give more efficacy to this lively impreſſion, the firſt poets ſung their verſes, and the words and phraſes muſt neceſſarily have been reduced, at leaſt to cadence, or they could not have been ſuſceptible of muſical expreſſion. One of the great excellencies, therefore, though not a neceſſary conſtituent, of poetry, conſiſts in its being expreſſed in verſe. See Part III.

PART I. GENERAL PRINCIPLES OF THE ART.

SECT. I. *Of the Eſſence and End of Poetry.*

8. UNDER the article *Polite* ARTS, it was obſerved, that the *eſſence* of theſe in general, and conſequently of poetry in particular, conſiſts in *expreſſion:* and we think, that, to be poetic, the expreſſion muſt neceſſarily ariſe from *fiction*, or invention *. This invention, which is the fruit of happy genius alone, ariſes, 1. From the ſubject itſelf of which we undertake to treat: 2. From the manner in which we treat that ſubject, or the ſpecies of writing of which we make uſe: 3. From the plan that we propoſe to follow in conformity to this manner; and, 4. From the method of executing this plan in its full detail. Our firſt guides, the ancients, afford us no lights that can elucidate all theſe objects in general. The precepts which Ariſtotle lays down, relate to epic and dramatic poetry only: and which, by the way, confirms our idea, that antiquity itſelf made the eſſence of poetry to conſiſt in fiction, and not in that ſpecies of verſe which is deſtitute of it, or in that which is not capable of it. But ſince this art has arrived to a great degree of perfection; and as poetry, like electricity, communicates its fire to every thing it touches, and animates and embelliſhes whatever it treats; there ſeems to be no ſubject in the univerſe to which poetry cannot be applied, and that it cannot render equally brilliant and pleaſing. From this univerſality of poetry, from its peculiar property of expreſſion by fiction, which is applicable to all ſubjects, have ariſen its different ſpecies, of which a particular deſcription will be given in the *ſecond* part.

9. Horace, in a well-known verſe, has been ſuppoſed to declare the *end* of poetry to be twofold, to pleaſe, or to inſtruct:

Aut prodeſſe volunt, aut delectare poetæ.

But Dr Beattie † maintains, that the ultimate end of this art is to pleaſe; inſtruction being only one of the means (and not always a neceſſary one) by which that ultimate end is to be accompliſhed. The paſſage, rightly underſtood, he obſerves, will not appear to contain any thing inconſiſtent with this doctrine. The author is there ſtating a compariſon between the Greek and Roman writers, with a view to the poetry of the ſtage; and, after commending the former for their correctneſs, and for the liberal ſpirit wherewith they conducted their literary labours, and blaming his countrymen for their inaccuracy and avarice, he proceeds thus: "The ends propoſed by our dramatic poets (or by poets in general) are, to pleaſe, to inſtruct, or to do both. When inſtruction is your aim, let your moral ſentences be expreſſed with brevity, that they may be readily underſtood, and long remembered: where you mean to pleaſe, let your fictions be conformable to truth, or probability. The elder part of your audience (or readers) have no reliſh for poems that give pleaſure only without inſtruction; nor the younger for ſuch writings as give inſtruction without pleaſure. He only can ſecure the univerſal ſuffrage in his favour, who blends the uſeful with the agreeable, and delights at the ſame time that he inſtructs the reader. Such are the works that bring money to the bookſeller, that paſs into foreign countries, and perpetuate the author's name thro' a long ſucceſſion of ages †."—Now, what is the meaning of all this? What, but that to the *perfection* of dramatic poetry (or, if you pleaſe, of poetry in general) both ſound morals and beautiful fiction are requiſite? But Horace never meant to ſay, that inſtruction, as well as pleaſure, is neceſſary to give to any compoſition the *poetical character:* or he would not in another place have celebrated, with ſo much affection and rapture, the melting ſtrains of Sappho, and the playful genius of Anacreon ‡,—two authors tranſcendently ſweet, but not remarkably inſtructive. We are ſure, that pathos, and harmony, and elevated language, were, in Horace's opinion, eſſential to poetry §; and of theſe decorations nobody will affirm that inſtruction is the end, who conſiders that the moſt inſtructive books in the world are written in plain proſe.

In ſhort, our author has endeavoured by many ingenious arguments and illuſtrations to eſtabliſh it as a truth in criticiſm, that the end of poetry is *to pleaſe.* Verſes, if pleaſing, may be poetical, though they convey little or no inſtruction; but verſes, whoſe ſole merit it is that they convey inſtruction, are not poetical. Inſtruction, however, he admits, eſpecially in poems of length, is neceſſary to their *perfection*, becauſe they would not be *perfectly agreeable* without it.

SECT. II. *Of the Standard of Poetical Invention.*

10. HOMER's beautiful deſcription of the heavens and earth, as they appear in a calm evening by the light of the moon and ſtars, concludes with this circumſtance, "And the heart of the ſhepherd is glad *." Madame Dacier, from the turn ſhe gives to the paſſage in her verſion, ſeems to think, and Pope, in order perhaps to make out his couplet, inſinuates, that the gladneſs of the ſhepherd is owing to his ſenſe of the utility of thoſe luminaries. And this may in part

---

* See ARTS (*Polite*), n° 7.

† *Eſſays on Poetry and Muſic*, Part I. chap. i.

† *Hor. Ar. Poet.* 333.—347.

‡ *Hor. Carm.* lib. 4 ode

§ *Hor. Sat.* lib. 1. ſat. 4. verſ. 40.

* *Iliad*, b. v. 555.

be the caſe: but this is not in Homer; nor is it a neceſſary conſideration. It is true, that, in contemplating the material univerſe, they who diſcern the cauſes and effects of things muſt be more rapturouſly entertained, than thoſe who perceive nothing but ſhape and ſize, colour and motion. Yet, in the mere outſide of nature's works, there is a ſplendor and a magnificence to which even untutored minds cannot attend, without great delight.

Beattie's Eſſays, Part I. chap. ii.

Not that all peaſants, or all philoſophers, are equally ſuſceptible of theſe charming impreſſions. It is ſtrange to obſerve the callouſneſs of ſome men, before whom all the glories of heaven and earth paſs in daily ſucceſſion, without touching their hearts, elevating their fancy, or leaving any durable remembrance. Even of thoſe who pretend to ſenſibility, how many are there to whom the luſtre of the riſing or ſetting ſun; the ſparkling concave of the midnight-ſky; the mountain-foreſt toſſing and roaring to the ſtorm, or warbling with all the melodies of a ſummer evening; the ſweet interchange of hill and dale, ſhade and ſunſhine, grove, lawn, and water, which an extenſive landſcape offers to the view; the ſcenery of the ocean, ſo lovely, ſo majeſtic, and ſo tremendous; and the many pleaſing varieties of the animal and vegetable kingdom, could never afford ſo much real ſatisfaction, as the ſteams and noiſe of a ball-room, the inſipid fiddling and ſqueaking of an opera, or the vexations and wranglings of a card-table!

But ſome minds there are of a different make; who, even in the early part of life, receive from the contemplation of Nature a ſpecies of delight which they would hardly exchange for any other; and who, as avarice and ambition are not the infirmities of that period, would, with equal ſincerity and rapture, exclaim,

I care not, Fortune, what you me deny;
You cannot rob me of free Nature's grace;
You cannot ſhut the windows of the ſky,
Through which Aurora ſhows her brightening face;
You cannot bar my conſtant feet to trace
The woods and lawns by living ſtream at eve.
Caſtle of Indolence.

Such minds have always in them the ſeeds of true taſte, and frequently of imitative genius. At leaſt, tho' their enthuſiaſtic or viſionary turn of mind (as the man of the world would call it) ſhould not always incline them to practiſe poetry or painting, we need not ſcruple to affirm, that without ſome portion of this enthuſiaſm no perſon ever became a true poet or painter. For he who would imitate the works of Nature, muſt firſt accurately obſerve them; and accurate obſervation is to be expected from thoſe only who take great pleaſure in it.

To a mind thus diſpoſed no part of creation is indifferent. In the crowded city, and howling wilderneſs; in the cultivated province, and ſolitary iſle; in the flowery lawn, and craggy mountain; in the murmur of the rivulet, and in the uproar of the ocean; in the radiance of ſummer, and gloom of winter; in the thunder of heaven, and in the whiſper of the breeze; he ſtill finds ſomething to rouſe or to ſoothe his imagination, to draw forth his affections, or to employ his underſtanding. And from every mental energy that is not attended with pain, and even from ſome of thoſe that are, as moderate terror and pity, a ſound mind derives ſatisfaction; exerciſe being equally neceſſary to the body and the ſoul, and to both equally productive of health and pleaſure.

This happy ſenſibility to the beauties of Nature ſhould be cheriſhed in young perſons. It engages them to contemplate the Creator in his wonderful works; it purifies and harmonizes the ſoul, and prepares it for moral and intellectual diſcipline; it ſupplies an endleſs ſource of amuſement; it contributes even to bodily health: and, as a ſtrict analogy ſubſiſts between material and moral beauty, it leads the heart by an eaſy tranſition from the one to the other; and thus recommends virtue for its tranſcendent lovelineſs, and makes vice appear the object of contempt and abomination. An intimate acquaintance with the beſt deſcriptive poets, Spenſer, Milton, and Thomſon, but above all with the divine Georgic, joined to ſome practice in the art of drawing, will promote this amiable ſenſibility in early years: for then the face of Nature has novelty ſuperadded to its other charms, the paſſions are not pre-engaged, the heart is free from care, and the imagination warm and romantic.

But, not to inſiſt longer on thoſe ardent emotions that are peculiar to the enthuſiaſtic diſciple of Nature, may it not be affirmed of all men, without exception, or at leaſt of all the enlightened part of mankind, that they are gratified by the contemplation of things natural, as oppoſed to unnatural? Monſtrous ſights pleaſe but for a moment, if they pleaſe at all; for they derive their charm from the beholder's amazement, which is quickly over. We read indeed of a man of rank in Sicily †, who chooſes to adorn his villa with pictures and ſtatues of moſt unnatural deformity: but it is a ſingular inſtance; and one would not be much more ſurpriſed to hear of a perſon living without food, or growing fat by the uſe of poiſon. To ſay of any thing, that it is *contrary to nature*, denotes cenſure and diſguſt on the part of the ſpeaker; as the epithet *natural* intimates an agreeable quality, and ſeems for the moſt part to imply, that a thing is as it ought to be, ſuitable to our own taſte, and congenial with our own conſtitution. Think, with what ſentiments we ſhould peruſe a poem, in which Nature was totally miſrepreſented, and principles of thought and of operation ſuppoſed to take place, repugnant to every thing we had ſeen or heard of:—in which, for example, avarice and coldneſs were aſcribed to youth, and prodigality and paſſionate attachment to the old; in which men were made to act at random, ſometimes according to character, and ſometimes contrary to it; in which cruelty and envy were productive of love, and beneficence and kind affection of hatred; in which beauty was invariably the object of diſlike, and uglineſs of deſire; in which ſociety was rendered happy by atheiſm and the promiſcuous perpetration of crimes, and juſtice and fortitude were held in univerſal contempt. Or think, how we ſhould reliſh a painting, where no regard was had to the proportions, colours, or any of the phyſical laws, of Nature:—where the ears and eyes of animals were placed in their ſhoulders; where the ſky was green, and the graſs crimſon; where trees grew with their branches in the earth, and their roots in the air; where men were ſeen fighting after their heads were cut off, ſhips ſailing on the land, lions entangled in cobwebs, ſheep preying on dead carcaſſes, fiſhes ſporting in the woods, and elephants walking on the ſea. Could ſuch figures and combinations give pleaſure, or merit the appellation of ſublime or beautiful? Should we heſitate to pronounce their author mad? And are the abſurdities of madmen proper ſubjects either of amuſement or of imitation to reaſonable beings?

---

† *Brydone's Tour in Sicily*, let. 24.

Let it be remarked too, that though we diſtinguiſh our internal powers by different names, becauſe otherwiſe we could not ſpeak of them ſo as to be underſtood, they are all but ſo many energies of the ſame individual mind; and therefore it is not to be ſuppoſed, that what contradicts any one leading faculty ſhould yield permanent delight to the reſt. That cannot be agreeable to reaſon, which conſcience diſapproves; nor can that gratify imagination, which is repugnant to reaſon.——Beſides, belief and acquieſcence of mind are pleaſant, as diſtruſt and diſbelief are painful: and therefore, that only can give ſolid and general ſatisfaction, which has ſomething of plauſibility in it; ſomething which we conceive it poſſible for a rational being to believe. But no rational being can acquieſce in what is obviouſly contrary to nature, or implies palpable abſurdity.

Poetry, therefore, and indeed every art whoſe end is to pleaſe, muſt be natural; and if ſo, muſt exhibit real matter of fact, or ſomething like it; that is, in other words, muſt be, either according to truth, or according to veriſimilitude.

And though every part of the material univerſe abounds in objects of pleaſurable contemplation, yet nothing in nature ſo powerfully touches our hearts, or gives ſo great variety of exerciſe to our moral and intellectual faculties, as man. Human affairs and human feelings are univerſally intereſting. There are many who have no great reliſh for the poetry that delineates only irrational or inanimate beings; but to that which exhibits the fortunes, the characters, and the conduct of men, there is hardly any perſon who does not liſten with ſympathy and delight. And hence, to imitate human action, is conſidered by Ariſtotle as eſſential to this art; and muſt be allowed to be eſſential to the moſt pleaſing and moſt inſtructive part of it, Epic and Dramatic compoſition. Mere deſcriptions, however beautiful, and moral reflections, however juſt, become tireſome, where our paſſions are not occaſionally awakened by ſome event that concerns our fellow-men. Do not all readers of taſte receive peculiar pleaſure from thoſe little tales or epiſodes with which Thomſon's deſcriptive poem on the Seaſons is here and there enlivened? and are they not ſenſible, that the thunder-ſtorm would not have been half ſo intereſting without the tale of the two lovers, (*Summ.* v. 1171); nor the harveſt-ſcene, without that of Palemon and Lavinia, (*Aut.* v. 177.); nor the driving ſnows, without that exquiſite picture of a man periſhing among them, (*Winter*, v. 276.)? It is much to be regretted, that Young did not employ the ſame artifice to animate his Night-Thoughts. Sentiments and deſcriptions may be regarded as the pilaſters, carvings, gildings, and other decorations of the poetical fabric; but human actions are the columns and the rafters, that give it ſtability and elevation. Or, changing the metaphor, we may conſider theſe as the ſoul which informs the lovely frame; while thoſe are little more than the ornaments of the body.

Whether the pleaſure we take in things natural, and our diſlike to what is the reverſe, be the effect of habit or of conſtitution, is not a material inquiry. There is nothing abſurd in ſuppoſing, that between the ſoul, in its firſt formation, and the reſt of nature, a mutual harmony and ſympathy may have been eſtabliſhed, which experience may indeed confirm, but no perverſe habits could entirely ſubdue. As no ſort of education could make man believe the contrary of a ſelf-evident axiom, or reconcile him to a life of perfect ſolitude; ſo we ſhould imagine, that our love of nature and regularity might ſtill remain with us in ſome degree, though we had been born and bred in the Sicilian villa above-mentioned, and never heard any thing applauded but what deſerved cenſure, nor cenſured but what merited applauſe. Yet habit muſt be allowed to have a powerful influence over the ſentiments and feelings of mankind. Objects to which we have been long accuſtomed, we are apt to contract a fondneſs for; we conceive them readily, and contemplate them with pleaſure; nor do we quit our old tracts of ſpeculation or practice, without reluctance and pain. Hence in part ariſes our attachment to our own profeſſions, our old acquaintaince, our native ſoil, our homes, and to the very hills, ſtreams, and rocks in our neighbourhood. It would therefore be ſtrange, if man, accuſtomed as he is from his earlieſt days to the regularity of nature, did not contract a liking to her productions, and principles of operation.

Yet we neither expect nor deſire, that every human invention, where the end is only to pleaſe, ſhould be an exact tranſcript of real exiſtence. It is enough, that the mind acquieſce in it as probable, or plauſible, or ſuch as we think might happen without any direct oppoſition to the laws of Nature:—Or, to ſpeak more accurately, it is enough, that it be conſiſtent, either, firſt, with general experience; or, ſecondly, with popular opinion; or, thirdly, that it be conſiſtent with itſelf, and connected with probable circumſtances.

Firſt: If a human invention be conſiſtent with *general* experience, we acquieſce in it as ſufficiently probable. *Particular* experiences, however, there may be, ſo uncommon and ſo little expected, that we ſhould not admit their probability, if we did not know them to be true. No man of ſenſe believes, that he has any likelihood of being enriched by the diſcovery of hidden treaſure; or thinks it probable, on purchaſing a lottery-ticket, that he ſhall gain the firſt prize: and yet great wealth has actually been acquired by ſuch good fortune. But we ſhould look upon theſe as poor expedients in a play or romance for bringing about a happy cataſtrophe. We expect that fiction ſhould be more conſonant to the general tenor of human affairs; in a word, that not poſſibility, but probability, ſhould be the ſtandard of poetical invention.

Secondly: Fiction is admitted as conformable to this ſtandard, when it accords with received opinions. Theſe may be erroneous, but are not often *apparently* repugnant to nature. On this account, and becauſe they are familiar to us from our infancy, the mind readily acquieſces in them, or at leaſt yields them that degree of credit which is neceſſary to render them pleaſing. Hence the fairies, ghoſts, and witches of Shakeſpeare, are admitted as probable beings; and angels obtain a place in religious pictures, though we know that they do not now appear in the ſcenery of real life. Even when a popular opinion has long been exploded, and has become repugnant to univerſal belief, the fictions built upon it are ſtill admitted as natural, becauſe they were accounted ſuch by the people to whom they were firſt addreſſed; whoſe ſentiments and views of things we are willing to adopt, when, by the power of pleaſing deſcription, we are introduced into their ſcenes, and made acquainted with their manners. Hence we admit the theology of the ancient poets, their Elyſium and Tartarus, Scylla and Charybdis, Cyclops and Circe, and the reſt of thoſe "beautiful wonders" (as Horace calls them) which were believed in the heroic ages; as well as the demons and enchantments of Taſſo, which may be ſuppoſed to have obtained no ſmall degree of credit among the Italians of the 16th century, and are ſuitable enough to the notions that prevailed univerſally in Europe not long before (A). In fact, when poetry is in other reſpects true; when it gives an accurate diſplay of thoſe parts of nature about which we know that men in all ages muſt have entertained the ſame opinion, namely, thoſe appearances in the viſible creation, and thoſe feelings and workings of the human mind, which are obvious to all mankind;—when poetry is thus far according to nature, we are very willing to be indulgent to what is fictitious in it, and to grant a temporary allowance to any ſyſtem of fable which the author pleaſes to adopt; provided that he lay the ſcene in a diſtant country, or fix the date to a remote period. This is no unreaſonable piece of complaiſance: we owe it both to the poet and to ourſelves; for without it we ſhould neither form a right eſtimate of his genius, nor receive from his works that pleaſure which they were intended to impart. Let him, however, take care, that his ſyſtem of fable be ſuch as his countrymen and cotemporaries (to whom his work is immediately addreſſed) might be ſuppoſed capable of yielding their aſſent to; for otherwiſe we ſhould not believe him to be in earneſt: and let him connect it as much as he can with probable circumſtances, and make it appear in a ſeries of events conſiſtent with itſelf.

For (thirdly) if this be the caſe, we ſhall admit his ſtory as probable, or at leaſt as natural, and conſequently be intereſted in it, even though it be not warranted by general experience, and derive but ſlender authority from popular opinion. Calyban, in the Tempeſt, would have ſhocked the mind as an improbability, if we had not been made acquainted with his origin, and ſeen his character diſplayed in a ſeries of conſiſtent behaviour. But when we are told that he ſprung from a witch and a demon, a connection not contrary to the laws of nature, as they were underſtood in Shakeſpeare's time, and find his manners conformable to his deſcent, we are eaſily reconciled to the fiction. In the ſame ſenſe, the Lilliputians of Swift may paſs for probable beings; not ſo much becauſe we know that a belief in pygmies was once current in the world, (for the true ancient pygmy was at leaſt thrice as tall as thoſe whom Gulliver viſited), but becauſe we find that every circumſtance relating to them accords with itſelf, and with their ſuppoſed character. It is not the ſize of the people only that is diminutive; their country, ſeas, ſhips, and towns, are all in exact proportion; their theological and political principles, their paſſions, manners, cuſtoms, and all the parts of their conduct, betray a levity and littleneſs perfectly ſuitable: and ſo ſimple is the whole narration, and apparently ſo artleſs and ſincere, that we ſhould not much wonder if it had impoſed (as we have been told it has) upon ſome perſons of no contemptible underſtanding. The ſame degree of credit may perhaps, for the ſame reaſons, be due to his giants. But when he grounds his narrative upon a contradiction to nature; when he preſents us with rational brutes, and irrational men; when he tells us of horſes building houſes for habitation, milking cows for food, riding in carriages, and holding converſations on the laws and politics of Europe; not all his genius (and he there exerts it to the utmoſt) is able to reconcile us to ſo monſtrous a fiction: we may ſmile at ſome of his abſurd exaggerations; we may be pleaſed with the energy of ſtyle, and accuracy of deſcription, in particular places; and a malevolent heart may triumph in the ſatire; but we can never reliſh it as a fable, becauſe it is at once unnatural and ſelf-contradictory. Swift's judgment ſeems to have forſaken him on this occaſion: he wallows in naſtineſs and brutality; and the general run of his ſatire is downright defamation. Lucian's *True Hiſtory* is a heap of extravagancies put together without order or unity, or any other apparent deſign than to ridicule the language and manner of grave authors. His ravings, which have no better right to the name of *Fable*, than a hill of rubbiſh has to that of palace, are deſtitute of every colour of plauſibility. Animal trees, ſhips ſailing in the ſky, armies of monſtrous things travelling between the ſun and moon on a pavement of cobwebs, rival nations of men inhabiting woods and mountains in a whale's belly,—are liker the dreams of a bedlamite than the inventions of a rational being.

Beattie's Eſſays, ut ſupra.

If we were to proſecute this ſubject any further, it would be proper to remark, that in ſome kinds of poetical invention a ſtricter probability is required than in others:—that, for inſtance, Comedy, whether dramatic or narrative (B), muſt ſeldom deviate from the ordinary courſe of human affairs, becauſe it exhibits the manners of real, and even of familiar life:—that the tragic poet, becauſe he imitates characters more exalted, and generally refers to events little known, or long ſince paſt, may be allowed a wider range; but muſt never attempt the marvellous fictions of the epic muſe,

---

(A) In the 14th century, the common people of Italy believed, that the poet Dante went down to hell; that the *Inferno* was a true account of what he ſaw there; and that his ſallow complexion, and ſtunted beard, (which ſeemed by its growth and colour to have been too near the fire), where the conſequence of his paſſing ſo much of his time in that hot and ſmoky region. See *Vicende della literatura del Sig. C. Denina, cap.* 4.

(B) Fielding's *Tom Jones*, *Amelia*, and *Joſeph Andrews*, are examples of what may be called the *Epic* or *Narrative Comedy*, or more properly, perhaps, *the Comic Epopee*.

muſe, becauſe he addreſſes his work, not only to the paſſions and imagination of mankind, but alſo to their eyes and ears, which are not eaſily impoſed on, and refuſe to be gratified with any repreſentation that does not come very near the truth:—that the epic poem may claim ſtill ampler privileges, becauſe its fictions are not ſubject to the ſcrutiny of any outward ſenſe, and becauſe it conveys information in regard both to the higheſt human characters, and the moſt important and wonderful events, and alſo to the affairs of unſeen worlds and ſuperior beings. Nor would it be improper to obſerve, that the ſeveral ſpecies of comic, of tragic, of epic compoſition, are not confined to the ſame degree of probability: for that farce may be allowed to be leſs probable than the regular comedy; the maſque than the regular tragedy; and the mixed epic, ſuch as the Fairy Queen, and Orlando Furioſo, than the pure epopee of Homer, Virgil, and Milton. But this part of the ſubject ſeems not to require further illuſtration. Enough has been ſaid to ſhow, that nothing unnatural can pleaſe; and that therefore poetry, whoſe end is to pleaſe, muſt be *according to nature*.

And if ſo, it muſt be, either according to real nature, or according to nature ſomewhat different from the reality.

SECT. III. *Of the Syſtem of Nature exhibited by Poetry.*

11. To exhibit *real nature* is the buſineſs of the hiſtorian; who, if he were ſtrictly to confine himſelf to his own ſphere, would never record even the minuteſt circumſtance of any ſpeech, event, or deſcription, which was not warranted by ſufficient authority. It has been the language of critics in every age, that the hiſtorian ought to relate nothing as true which is falſe or dubious, and to conceal nothing material which he knows to be true. But it is to be doubted whether any writer of profane hiſtory has ever been ſo ſcrupulous. Thucydides himſelf, who began his hiſtory when that war began which he records, and who ſet down every event ſoon after it happened, according to the moſt authentic information, ſeems, however, to have indulged his fancy not a little in his harangues and deſcriptions, particularly that of the plague of Athens: and the ſame thing has been practiſed, with greater latitude, by Livy and Tacitus, and more or leſs by all the beſt hiſtorians both ancient and modern. Nor are they to be blamed for it. By theſe improved or invented ſpeeches, and by the heightenings thus given to their deſcriptions, their work becomes more intereſting, and more uſeful; nobody is deceived, and hiſtorical truth is not materially affected. A medium is, however, to be obſerved in this, as in other things. When the hiſtorian lengthens a deſcription into a detail of fictitious events, as Voltaire has done in his account of the battle of Fontenoy, he loſes his credit with us, by raiſing a ſuſpicion that he is more intent upon a pretty ſtory, than upon the truth. And we are diſguſted with his inſincerity, when, in defiance even of veriſimilitude, he puts long elaborate orations in the mouth of thoſe, of whom we know, either from the circumſtances that they could not, or from more authentic records that they did not, make any ſuch orations; as Dionyſius of Halicarnaſſus has done in the caſe of Volumnia haranguing her ſon Coriolanus, and Flavius Joſephus in that of Judah addreſſing his brother as viceroy of Egypt. From what theſe hiſtorians relate, one would conjecture, that the Roman matron had ſtudied at Athens under ſome long-winded rhetorician, and that the Jewiſh patriarch muſt have been one of the moſt flowery orators of antiquity. But the fictitious part of hiſtory, or of ſtory-telling, ought never to take up much room; and muſt be highly blameable when it leads into any miſtake either of facts or of characters.

Now, why do hiſtorians take the liberty to embelliſh their works in this manner? One reaſon, no doubt, is, that they may diſplay their talents in oratory and narration: but the chief reaſon, as hinted already, is, to render their compoſition more agreeable. It would ſeem, then, that ſomething more pleaſing than real nature, or ſomething which ſhall add to the pleaſing qualities of real nature, may be deviſed by human fancy. And this may certainly be done. And this it is the poet's buſineſs to do. And when this is in any degree done by the hiſtorian, his narrative becomes in that degree poetical.

Beattie's Eſſays, chap. ii.

The poſſibility of thus improving upon nature muſt be obvious to every one. When we look at a landſcape, we can fancy a thouſand additional embelliſhments. Mountains loftier and more pictureſque; rivers more copious, more limpid, and more beautifully winding; ſmoother and wider lawns; valleys more richly diverſified; caverns and rocks more gloomy and more ſtupendous; ruins more majeſtic; buildings more magnificent; oceans more varied with iſlands, more ſplendid with ſhipping, or more agitated by ſtorm, than any we have ever ſeen, it is eaſy for human imagination to conceive. Many things in art and nature exceed expectation; but nothing ſenſible tranſcends, or equals, the capacity of thought:—a ſtriking evidence of the dignity of the human ſoul! The fineſt woman in the world appears to every eye ſuſceptible of improvement, except perhaps to that of her lover. No wonder, then, if in poetry events can be exhibited more compact, and of more pleaſing variety, than thoſe delineated by the hiſtorian, and ſcenes of inanimate nature more dreadful or more lovely, and human characters more ſublime and more exquiſite, both in good and evil. Yet ſtill let nature ſupply the ground-work and materials, as well as the ſtandard, of poetical fiction. The moſt expert painters uſe a layman, or other viſible figure, to direct their hand and regulate their fancy. Homer himſelf founds his two poems on authentic tradition; and tragic as well as epic poets have followed the example. The writers of romance, too, are ambitious to interweave true adventures with their fables; and when it can be conveniently done, to take the outlines of their plan from real life. Thus the tale of Robinſon Cruſoe is founded on an incident that actually befel one Alexander Selkirk, a ſea-faring man, who lived ſeveral years alone in the iſland of Juan Fernandes: Smollet is thought to have given us ſeveral of his own adventures in the hiſtory of Roderic Random; and the chief characters in Tom Jones, Joſeph Andrews, and Pamela, are ſaid to have been copied from real originals.—Dramatic comedy, indeed, is for the moſt part purely fictitious: for if it were to exhibit real events as well as preſent manners, it would become too perſonal to be endured by a well-bred audience, and degenerate into downright abuſe; which appears to have been the caſe with the old comedy of the Greeks *. But in general, hints taken from real exiſtence will be found to give no little grace and ſtability to fiction, even in the moſt fanciful poems. Thoſe hints, however, may be improved by the poet's imagination, and ſet off with every probable ornament that can be deviſed, conſiſtently with the deſign and genius of the work;—or, in other words, with the ſympathies that the poet means to awaken in the mind of his reader. For mere poetical ornament, when it fails to intereſt the affections, is not only uſeleſs but improper; all true poetry being addreſſed to the heart, and intended to give pleaſure by raiſing or ſoothing the paſſions;—the only effectual way of pleaſing a rational and moral creature. And therefore we would take Horace's maxim to be univerſal in poetry: "*Non ſatis eſt, pulchra eſſe poemata;* dulcia *ſunto*:" "It is not enough that poems be beautiful; let them alſo be *affecting*:"—For that this is the meaning of the word *dulcia* in this place, is admitted by the beſt interpreters, and is indeed evident from the context †.

* *Compare Hor.* lib. 1. ſat. 4. verſ. .—5. with *Ar. Poet.* verſ. 281.—85.

† *Hor. Ar. poet.* verſ. —100.

That the ſentiments and feelings of percipient beings, when expreſſed in poetry, ſhould call forth our affections, is natural enough; but can deſcriptions of inanimate things alſo be made affecting? Certainly they can: and the more they affect, the more they pleaſe us, and the more poetical we allow them to be. Virgil's Georgic is a noble ſpecimen (and indeed the nobleſt in the world) of this ſort of poetry. His admiration of external nature gains upon a reader of taſte, till it riſe to perfect enthuſiaſm. The following obſervations will perhaps explain this matter.

Every thing in nature is complex in itſelf, and bears innumerable relations to other things; and may therefore be viewed in an endleſs variety of lights, and conſequently deſcribed in an endleſs variety of ways. Some deſcriptions are good, and others bad. An hiſtorical deſcription, that enumerates all the qualities of any object, is certainly good, becauſe it is true; but may be as unaffecting as a logical definition. In poetry, no unaffecting deſcription is good, however conformable to truth; for here we expect not a complete enumeration of qualities, (the chief end of the art being to pleaſe), but only ſuch an enumeration as may give a lively and intereſting idea. It is not memory, or the knowledge of rules, that can qualify a poet for this ſort of deſcription; but a peculiar livelineſs of fancy and ſenſibility of heart, the nature whereof we may explain by its effects, but we cannot lay down rules for the attainment of it.

When our mind is occupied by any emotion, we naturally uſe words and meditate on things that are ſuitable to it and tend to encourage it. If a man were to write a letter when he is very angry, there would probably be ſomething of vehemence or bitterneſs in the ſtyle, even though the perſon to whom he wrote were not the object of his anger. The ſame thing holds true of every other ſtrong paſſion or emotion:—while it predominates in the mind, it gives a peculiarity to our thoughts, as well as to our voice, geſture, and countenance: And hence we expect, that every perſonage introduced in poetry ſhould ſee things through the medium of his ruling paſſion, and that his thoughts and language ſhould be tinctured accordingly. A melancholy man walking in a grove, attends to thoſe things that ſuit and encourage his melancholy; the ſighing of the wind in the trees, the murmuring of waters, the darkneſs and ſolitude of the ſhades: A cheerful man in the ſame place, finds many ſubjects of cheerful meditation, in the ſinging of birds, the briſk motions of the babling ſtream, and the livelineſs and variety of the verdure. Perſons of different characters, contemplating the ſame thing, a Roman triumph, for inſtance, feel different emotions, and turn their view to different objects. One is filled with wonder at ſuch a diſplay of wealth and power; another exults in the idea of conqueſt, and pants for military renown; a third, ſtunned with clamour, and harraſſed with confuſion, wiſhes for ſilence, ſecurity, and ſolitude; one melts with pity to the vanquiſhed, and makes many a ſad reflection upon the inſignificance of worldly grandeur, and the uncertainty of human things; while the buffoon, and perhaps the philoſopher, conſiders the whole as a vain piece of pageantry, which, by its ſolemn procedure, and by the admiration of ſo many people, is only rendered the more ridiculous:—and each of theſe perſons would deſcribe it in a way ſuitable to his own feelings, and tending to raiſe the ſame in others. We ſee in Milton's Allegro and Penſoroſo, how a different caſt of mind produces a variety in the manner of conceiving and contemplating the ſame rural ſcenery. In the former of theſe excellent poems, the author perſonates a cheerful man, and takes notice of thoſe things in external nature that are ſuitable to cheerful thoughts, and tend to encourage them: in the latter, every object deſcribed is ſerious and ſolemn, and productive of calm reflection and tender melancholy: and we ſhould not be eaſily perſuaded, that Milton wrote the firſt under the influence of ſorrow, or the ſecond under that of gladneſs. We often ſee an author's character in his works; and if every author were in earneſt when he writes, we ſhould oftener ſee it. Thomſon was a man of piety and benevolence, and a warm admirer of the beauties of nature; and every deſcription in his delightful poem on the Seaſons tends to raiſe the ſame laudable affections in his reader. The parts of nature that attract his notice are thoſe which an impious or hard-hearted man would neither attend to, nor be affected with, at leaſt in the ſame manner. In Swift we ſee a turn of mind very different from that of the amiable Thomſon; little reliſh for the ſublime or beautiful, and a perpetual ſucceſſion of violent emotions. All his pictures of human life ſeem to ſhow, that deformity and meanneſs were the favourite objects of his attention, and that his ſoul was a conſtant prey to indignation (c), diſguſt, and other gloomy paſſions, ariſing from ſuch a view of things. And it is the tendency of almoſt all his writings, (though it was not always the author's deſign), to communicate the ſame paſſions to his reader: inſomuch, that notwithſtanding his erudition and know-

Beattie's Eſſays, ut ſupra.

(c) For part of this remark we have his own authority, often in his letters, and very explicitly in the Latin epitaph which he compoſed for himſelf:—" ubi ſæva indignatio ulterius cor lacerare nequit." *See his laſt will and teſtament.*

Of Nature in Poetry.

knowledge of the world, his abilities as a popular orator and man of buſineſs, the energy of his ſtyle, the elegance of ſome of his verſes, and his extraordinary talents in wit and humour, there is reaſon to doubt, whether by ſtudying his works any perſon was ever much improved in piety or benevolence.

And thus we ſee, how the compoſitions of an ingenious author may operate upon the heart, whatever be the ſubject. The affections that prevail in the author himſelf direct his attention to objects congenial, and give a peculiar bias to his inventive powers, and a peculiar colour to his language. Hence his work, as well as face, if nature is permitted to exert herſelf freely in it, will exhibit a picture of his mind, and awaken correſpondent ſympathies in the reader. When theſe are favourable to virtue, which they always ought to be, the work will have that ſweet pathos which Horace alludes in the paſſage above mentioned; and which we ſo highly admire, and ſo warmly approve, even in thoſe parts of the Georgic that deſcribe inanimate nature.

Horace's account of the matter in queſtion differs not from what is here given. "It is not enough (ſays he*) that poems be beautiful; let them be affecting, and agitate the mind with whatever paſſions the poet wiſhes to impart. The human countenance, as it ſmiles on thoſe who ſmile, accompanies alſo with ſympathetic tears thoſe who mourn. If you would have me weep, you muſt firſt weep yourſelf; then, and not before, ſhall I be touched with your misfortunes.—For nature firſt makes the emotions of our mind correſpond with our circumſtances, infuſing real joy, ſorrow, or reſentment, according to the occaſion; and afterwards gives the true pathetic utterance to the voice and language." This doctrine, which concerns the orator and the player no leſs than the poet, is ſtrictly philoſophical, and equally applicable to dramatic, to deſcriptive, and indeed to every ſpecies of intereſting poetry. The poet's ſenſibility muſt firſt of all engage him warmly in his ſubject, and in every part of it; otherwiſe he will labour in vain to intereſt the reader. If he would paint external nature, as Virgil and Thomſon have done, ſo as to make her amiable to others, he muſt firſt be enamoured of her himſelf; if he would have his heroes and heroines ſpeak the language of love or ſorrow, devotion or courage, ambition or anger, benevolence or pity, his heart muſt be ſuſceptible of thoſe emotions, and in ſome degree feel them, as long at leaſt as he employs himſelf in framing words for them; being aſſured, that

> He beſt ſhall paint them who can feel them moſt.
>
> Pope's *Eloiſa*, v. 366.

The true poet, therefore, muſt not only ſtudy nature, and know the reality of things; but muſt alſo poſſeſs fancy, to invent additional decorations; judgment, to direct him in the choice of ſuch as accord with veriſimilitude; and ſenſibility, to enter with ardent emotions into every part of his ſubject, ſo as to transfuſe into every part of his work a pathos and energy ſufficient to raiſe correſponding emotions in the reader.

"The hiſtorian and the poet (ſays Ariſtotle†) differ in this, that the former exhibits things as they are, the latter as they might be;"—*i. e.* in that ſtate of perfection which is conſiſtent with probability, and in which, for the ſake of our own gratification, we wiſh to find them. If the poet, after all the liberties he is allowed to take with the truth, can produce nothing more exquiſite than is commonly to be met with in hiſtory, his reader will be diſappointed and diſſatisfied. Poetical repreſentations muſt therefore be framed after a pattern of the higheſt probable perfection that the genius of the work will admit:—external nature muſt in them be more pictureſque than in reality; action more animated; ſentiments more expreſſive of the feelings and character, and more ſuitable to the circumſtances of the ſpeaker; perſonages better accompliſhed in thoſe qualities that raiſe admiration, pity, terror, and other ardent emotions; and events, more compact, more clearly connected with cauſes and conſequences, and unfolded in an order more flattering to the fancy, and more intereſting to the paſſions. But where, it may ſaid, is this pattern of perfection to be found? Not in real nature; otherwiſe hiſtory, which delineates real nature, would alſo delineate this pattern of perfection. It is to be found only in the mind of the poet; and it is imagination, regulated by knowledge, that enables him to form it.

Of Nature in Poetry.

In the beginning of life, and while experience is confined to a ſmall circle, we admire every thing, and are pleaſed with very moderate excellence. A peaſant thinks the hall of his landlord the fineſt apartment in the univerſe, liſtens with rapture to the ſtrolling ballad-ſinger, and wonders at the rude wooden cuts that adorn his ruder compoſitions. A child looks upon his native village as a town; upon the brook that runs by, as a river; and upon the meadows and hills in the neighbourhood, as the moſt ſpacious and beautiful that can be. But when, after long abſence, he returns in his declining years, to viſit, once before he die, the dear ſpot that gave him birth, and thoſe ſcenes whereof he remembers rather the original charms than the exact proportions; how is he diſappointed to find every thing ſo debaſed, and ſo diminiſhed! The hills ſeem to have ſunk into the ground, the brook to be dried up, and the village to be forſaken of its people; the pariſh-church, ſtripped of all its fancied magnificence, is become low, gloomy, and narrow; and the fields are now only the miniature of what they were. Had he never left this ſpot, his notions might have remained the ſame as at firſt; and had he travelled but a little way from it, they would not perhaps have received any material enlargement. It ſeems then to be from obſervation of many things of the ſame or ſimilar kinds, that we acquire the talent of forming ideas more perfect than the real objects that lie immediately around us: and theſe ideas we may improve gradually more and more, according to the vivacity of our mind, and extent of our experience, till at laſt we come to raiſe them to a degree of perfection ſuperior to any thing to be found in real life. There cannot, ſure, be any myſtery in this doctrine; for we think and ſpeak to the ſame purpoſe every day. Thus nothing is more common than to ſay, that ſuch an artiſt excels all we have ever known in his profeſſion, and yet that we can ſtill conceive a ſuperior peformance. A moraliſt, by bringing together into one view the ſeparate virtues of many perſons, is enabled to lay down a ſyſtem of duty more perfect than any he has ever ſeen exemplified in human conduct. Whatever be the emotion the poet intends to raiſe in his reader, whether admiration or terror, joy or ſorrow; and whatever be the object he would exhibit,

---

* *Ar. Poet.* v. 99.--111.

† Poetic. ſect. 9.

Of Nature in Poetry.

exhibit, whether Venus or Tiſiphone, Achilles or Therſites, a palace or a pile of ruins, a dance or a battle; he generally copies an idea of his own imagination; conſidering each quality as it is found to exiſt in ſeveral individuals of a ſpecies, and thence forming an aſſemblage more or leſs perfect in its kind, according to the purpoſe to which he means to apply it.

Hence it would appear, that the ideas of poetry are rather general than ſingular; rather collected from the examination of a ſpecies or claſs of things, than copied from an individual. And this, according to Ariſtotle, is in fact the caſe, at leaſt for the moſt part; whence that critic determines, that poetry is ſomething more exquiſite and more philoſophical than hiſtory*. The hiſtorian may deſcribe Bucephalus, but the poet delineates a war-horſe; the former muſt have ſeen the animal he ſpeaks of, or received authentic information concerning it, if he mean to deſcribe it hiſtorically; for the latter, it is enough that he has ſeen ſeveral animals of that ſort. The former tells us, what Achilles actually did and ſaid; the latter, what ſuch a ſpecies of human character as that which bears the name of Achilles would probably do or ſay in certain given circumſtances.

It is indeed true, that the poet may, and often does, copy after individual objects. Homer, no doubt, took his characters from the life; or at leaſt, in forming them, was careful to follow tradition as far as the nature of his plan would allow. But he probably took the freedom to add or heighten ſome qualities, and take away others; to make Achilles, for example, ſtronger, perhaps, and more impetuous, and more eminent for filial affection, and Hector more patriotic and more amiable, than he really was. If he had not done this, or ſomething like it, his work would have been rather a hiſtory than a poem; would have exhibited men and things as they were, and not as they might have been; and *Achilles* and *Hector* would have been the names of individual and real heroes; whereas, according to Ariſtotle, they are rather to be conſidered as two diſtinct modifications or ſpecies of the heroic character. Shakeſpeare's account of the cliffs of Dover comes ſo near the truth, that we cannot doubt of its having been written by one who had ſeen them: but he who takes it for an exact hiſtorical deſcription, will be ſurpriſed when he comes to the place, and finds thoſe cliffs not half ſo lofty as the poet had made him believe. An hiſtorian would be to blame for ſuch amplification; becauſe, being to deſcribe an individual precipice, he ought to tell us juſt what it is; which if he did, the deſcription would ſuit that place, and perhaps no other in the whole world. But the poet means only to give an idea of what ſuch a precipice may be; and therefore his deſcription may perhaps be equally applicable to many ſuch chalky precipices on the ſea-ſhore.

This method of copying after general ideas formed by the artiſt from obſervation of many individuals, diſtinguiſhes the Italian and all the ſublime painters, from the Dutch and their imitators. Theſe give us bare nature, with the imperfections and peculiarities of individual things or perſons; but thoſe give nature improved as far as probability and the deſign of the piece will admit. Teniers and Hogarth draw faces, and figures, and dreſſes, from real life, and preſent manners; and therefore their pieces muſt in ſome degree loſe the effect, and become aukward, when the preſent faſhions become obſolete.——Raphael and Reynolds take their models from general nature; avoiding, as far as poſſible, (at leaſt in all their great performances), thoſe peculiarities that derive their beauty from mere faſhion; and therefore their works muſt give pleaſure, and appear elegant, as long as men are capable of forming general ideas, and of judging from them. The laſt-mentioned incomparable artiſt is particularly obſervant of children, whoſe looks and attitudes, being leſs under the control of art and local manners, are more characteriſtical of the ſpecies than thoſe of men and women. This field of obſervation has ſupplied him with many fine figures, particularly that moſt exquiſite one of Comedy, ſtruggling for and winning (for who could reſiſt her!) the affections of Garrick:—a figure which could never have occurred to the imagination of a painter who had confined his views to grown perſons looking and moving in all the formality of polite life;—a figure which in all ages and countries would be pronounced natural and engaging;—whereas thoſe human forms that we ſee every day bowing, and courteſying, and ſtrutting, and turning out their toes *ſecundum artem*, and dreſſed in ruffles, and wigs, and flounces, and hoop-petticoats, and full-trimmed ſuits, would appear elegant no further than the preſent faſhions are propagated, and no longer than they remain unaltered.

There is, in the progreſs of human ſociety, as well as of human life, a period to which it is of great importance for the higher order of poets to attend, and from which they will do well to take their characters, and manners, and the æra of their events; namely, that wherein men are raiſed above ſavage life, and conſiderably improved by arts, government, and converſation; but not advanced ſo high in the aſcent towards politeneſs, as to have acquired a habit of diſguiſing their thoughts and paſſions, and of reducing their behaviour to the uniformity of the mode. Such was the period which Homer had the good fortune (as a poet) to live in, and to celebrate. This is the period at which the manners of men are moſt pictureſque, and their adventures moſt romantic. This is the period when the appetites unperverted by luxury, the powers unenervated by effeminacy, and the thoughts diſengaged from artificial reſtraint, will, in perſons of ſimilar diſpoſitions and circumſtances, operate in nearly the ſame way; and when, conſequently, the characters of particular men will approach to the nature of poetical or general ideas, and, if well imitated, give pleaſure to the whole, or at leaſt to a great majority of mankind. But a character tinctured with the faſhions of polite life would not be ſo generally intereſting. Like a human figure adjuſted by a modern dancing-maſter, and dreſſed by a modern tailor, it may have a good effect in ſatire, comedy, or farce: but if introduced into the higher poetry, it would be admired by thoſe only who had learned to admire nothing but preſent faſhions, and by them no longer than the preſent faſhions laſted; and to all the reſt of the world would appear aukward, unaffecting, and perhaps ridiculous. But Achilles and Sarpedon, Diomede and Hector, Neſtor and Ulyſſes, as drawn by Homer, muſt in all ages, independently on faſhion, command the attention and admiration of mankind. Theſe have the qualities that are univerſally known to belong to human nature; whereas the modern fine gentleman is diſtinguiſhed by qualities that belong only to a particular age, ſociety, and corner of the world. We ſpeak not of moral or intellectual virtues, which are objects of admiration to every age; but of thoſe outward accompliſhments, and that particular temperature of the paſſions, which form the moſt perceptible part of a human character.——As, therefore, the politician, in diſcuſſing the rights of mankind, muſt often allude to an imaginary ſtate of nature; ſo the poet who intends to raiſe admiration, pity, terror, and other important emotions, in the generality of mankind, eſpecially in thoſe readers whoſe minds are moſt improved, muſt take his pictures of life and manners, rather from the heroic period we now ſpeak of, than from the ages of refinement; and muſt therefore (to repeat the maxim of Ariſtotle) "exhibit things, not as they are, but as they might be."

---

* Poetic. 9.

SECT. IV *Of Poetical Characters.*

12. HORACE ſeems to think, that a competent knowledge of moral philoſophy will fit an author for aſſigning the ſuitable qualities and duties to each poetical perſonage: (*Ar. Poet.* v. 309.—316.) The maxim may be true, as far as mere morality is the aim of the poet; but cannot be underſtood to refer to the delineation of poetical characters in general: for a thorough acquaintance with all the moral philoſophy in the world would not have enabled Blackmore to paint ſuch a perſonage as Homer's Achilles, Shakeſpeare's Othello, or the Satan of Paradiſe Loſt. To a competency of moral ſcience, there muſt be added an extenſive knowledge of mankind, a warm and elevated imagination, and the greateſt ſenſibility of heart, before a genius can be formed equal to ſo difficult a taſk. Horace is indeed ſo ſenſible of the danger of introducing a new character in poetry, that he even diſcourages the attempt, and adviſes the poet rather to take his perſons from the ancient authors, or from tradition: (*Ibid.* v. 119.—130.)

To conceive the idea of a good man, and to invent and ſupport a great poetical character, are two very different things, however they may ſeem to have been confounded by ſome late critics. The firſt is eaſy to any perſon ſufficiently inſtructed in the duties of life: the laſt is perhaps of all the efforts of human genius the moſt difficult; ſo very difficult, that, though attempted by many, Homer, Shakeſpeare, and Milton, are almoſt the only authors who have ſucceeded in it. But characters of perfect virtue are not the moſt proper for poetry. It ſeems to be agreed, that the Deity ſhould not be introduced in the machinery of a poetical fable. To aſcribe to him words and actions of our own invention, ſeems very unbecoming; nor can a poetical deſcription, that is known to be, and muſt of neceſſity be, infinitely inadequate, ever ſatisfy the human mind. Poetry, according to the beſt critics, is an imitation of human action; and therefore poetical characters, though elevated, ſhould ſtill partake of the paſſions and frailties of humanity. If it were not for the vices of ſome principal perſonages, the Iliad would not be either ſo intereſting or ſo moral:—the moſt moving and moſt eventful parts of the Æneid are thoſe that deſcribe the effects of unlawful paſſion:—the moſt inſtructive tragedy in the world, we mean Macbeth, is founded in crimes of dreadful enormity:—and if Milton had not taken into his plan the fall of our firſt parents, as well as their ſtate of innocence, his divine poem muſt have wanted much of its pathos, and could not have been (what it now is) ſuch a treaſure of important knowledge, as no other uninſpired writer ever comprehended in ſo ſmall a compaſs.——Virtue, like truth, is uniform and unchangeable. We may anticipate the part a good man will act in any given circumſtances: and therefore the events that depend on ſuch a man muſt be leſs ſurpriſing than thoſe which proceed from paſſion; the viciſſitudes whereof it is frequently impoſſible to foreſee. From the violent temper of Achilles in the Iliad, ſpring many great incidents; which could not have taken place, if he had been calm and prudent like Ulyſſes, or pious and patriotic like Eneas:—his rejection of Agamemnon's offers, in the ninth book, ariſes from the violence of his reſentment;—his yielding to the requeſt of Patroclus, in the 16th, from the violence of his friendſhip (if we may ſo ſpeak) counteracting his reſentment; and his reſtoring to Priam the dead body of Hector, in the 24th, from the violence of his affection to his own aged father, and his regard to the command of Jupiter, counteracting, in ſome meaſure, both his ſorrow for his friend, and his thirſt for vengeance.——Beſides, except where there is ſome degree of vice, it pains us too exquiſitely to ſee misfortune; and therefore poetry would ceaſe to have a pleaſurable influence over our tender paſſions, if it were to exhibit virtuous characters only. And as in life, evil is neceſſary to our moral probation, and the poſſibility of error to our intellectual improvement; ſo bad or mixed characters are uſeful in poetry, to give to the good ſuch oppoſition, as puts them upon diſplaying and exerciſing their virtue.

All thoſe perſonages, however, in whoſe fortune the poet means that we ſhould be intereſted, muſt have agreeable and admirable qualities to recommend them to our regard. And perhaps the greateſt difficulty in the art lies in ſuitably blending thoſe faults, which the poet finds it expedient to give to any particular hero, with ſuch moral, intellectual, or corporeal accompliſhments, as may engage our eſteem, pity, or admiration, without weakening our hatred of vice, or love of virtue. In moſt of our novels, and in many of our plays, it happens unluckily, that the hero of the piece is ſo captivating, as to incline us to be indulgent to every part of his character, the bad as well as the good. But a great maſter knows how to give the proper direction to human ſenſibility; and, without any perverſion of our faculties, or any confuſion of right and wrong, to make the ſame perſon the object of very different emotions, of pity and hatred, of admiration and horror. Who does not eſteem and admire Macbeth for his courage and generoſity? who does not pity him when beſet with all the terrors of a pregnant imagination, ſuperſtitious temper, and awakened conſcience? who does not abhor him as a monſter of cruelty, treachery, and ingratitude? His good qualities, by drawing us near to him, make us, as it were, eye-witneſſes of his crime, and give us a fellow-feeling of his remorſe; and therefore, his example cannot fail to have a powerful effect in cheriſhing our love of virtue, and fortifying our minds againſt criminal impreſſions: whereas, had he wanted thoſe good qualities, we ſhould have kept aloof from his concerns, or viewed them with a ſuperficial attention; in which caſe his example would have had little more weight, than that of the robber, of whom we know nothing, but that he was tried, condemned, and executed.—Satan, in Paradiſe Laſt, is a character drawn and ſupported with the moſt conſummate judgment. The old furies and demons, Hecate, Tiſiphone, Alecto, Megara, are objects of unmixed and unmitigated abhorrence; Tityus, Enceladus, and their brethren, are remarkable for nothing but impiety, deformity, and vaſtneſs of ſize; Pluto is, at beſt, an inſipid perſonage; Mars, a hairbrained ruffian; Taſſo's infernal tyrant, an ugly and overgrown monſter:—but in the Miltonic Satan, we are forced to admire the majeſty of the ruined archangel, at the ſame time that we deteſt the unconquerable depravity of the fiend. "But, of all poetical characters, (ſays the elegrant critic from whom we are extracting), the Achilles of Homer (F) ſeems to me the moſt exquiſite of the invention, and the moſt highly finiſhed. The utility of this character in a moral view is obvious; for it may be conſidered as the ſource of all the morality of the Iliad. Had not the generous and violent temper of Achilles determined him to patroniſe the augur Calchas in defiance of Agamemnon, and afterwards, on being affronted by that vindictive commander, to abandon for a time the common cauſe of Greece;—the fatal effects of diſſenſion among confederates, and of capricious and tyrannical behaviour in a ſovereign, would not have been the leading moral of Homer's poetry; nor could Hector, Sarpedon, Eneas, Ulyſſes, and the other amiable heroes, have been brought forward to ſignalize their virtues, and recommend themſelves to the eſteem and imitation of mankind.

Beattie's Eſſays.

"They who form their judgment of Achilles from the imperfect ſketch given of him by Horace in the *Art of Poetry*, (v. 121, 122.); and conſider him only as a hateful compoſition of anger, revenge, fierceneſs, obſtinacy, and pride, can never enter into the views of Homer, nor be ſuitably affected with his narration. All theſe vices are no doubt, in ſome degree, combined in Achilles; but they are tempered with qualities of a different ſort, which render him a moſt intereſting character, and of courſe make the Iliad a moſt intereſting poem. Every reader abhors the faults of this hero: and yet, to an attentive reader of Homer, this hero muſt be the object of eſteem, admiration, and pity; for he has many good as well as bad affections, and is equally violent in all:—Nor is he poſſeſſed of a ſingle vice or virtue, which the wonderful art of the poet has not made ſubſervient to the deſign of the poem, and to the progreſs and cataſtrophe of the action; ſo that the hero of the Iliad, conſidered as a poetical perſonage, is juſt what he ſhould be, neither greater nor leſs, neither worſe nor better.—He is every where diſtinguiſhed by an abhorrence of oppreſſion, by a liberal and elevated mind, by a paſſion for glory, and by a love of truth, freedom, and ſincerity. He is for the moſt part attentive to the duties of religion; and, except to thoſe who have injured him, courteous and kind: he is affectionate to his tutor Phenix; and not only pities the misfortunes of his enemy Priam, but in the moſt ſoothing manner adminiſters to him the beſt conſolation that poor Homer's theology could furniſh. Though no admirer of the cauſe in which his evil deſtiny compels him to engage, he is warmly attached to his native land; and, ardent as he is in vengeance, he is equally ſo in love to his aged father Peleus, and to his friend Patroclus. He is not luxurious like Paris, nor clowniſh like Ajax; his accompliſhments are princely, and his amuſements worthy of a hero. Add to this, as an apology for the vehemence of his anger, that the affront he had received was (according to the manners of that age) of the moſt atrocious nature; and not only unprovoked, but ſuch as, on the part of Agamemnon, betrayed a brutal inſenſibility to merit, as well as a proud, ſelfiſh, ungrateful, and tyrannical diſpoſition. And though he is often inexcuſeably furious; yet it is but juſtice to remark, that he was not naturally cruel (G); and that his wildeſt outrages were ſuch as in thoſe rude times might be expected from a violent man of invincible ſtrength and valour, when exaſperated by injury, and frantic with ſorrow.——Our hero's claim to the admiration of mankind is indiſputable. Every part of his character is ſublime and aſtoniſhing. In his perſon, he is the ſtrongeſt, the ſwifteſt, and moſt beautiful of men:—this laſt circumſtance, however, occurs not to his own obſervation, being too trivial to attract the notice of ſo great a mind. The Fates had put it in his power, either to return home before the end of the war, or to remain at Troy:—if he choſe the former, he would enjoy tranquillity and happineſs in his own country to a good old age; if the latter, he muſt periſh in the bloom of his youth:—his affection to his father and native country, and his hatred to Agamemnon, ſtrongly urged him to the firſt; but a deſire to avenge the death of his friend determines him to accept the laſt, with all its conſequences. This at once diſplays the greatneſs of his fortitude, the warmth of his friendſhip, and the violence of his ſanguinary paſſions: and it is this that ſo often and ſo powerfully recommends him to the pity, as well as admiration, of the attentive reader."

It is equally a proof of rich invention and exact judgment in Homer, that he mixes ſome good qualities in all his bad characters, and ſome degree of imperfection in almoſt all his good ones.——Agamemnon, notwithſtanding his pride, is an able general, and a valiant man, and highly eſteemed as ſuch by the greater part of the army.——Paris, though effeminate,

---

(F) "I ſay the *Achilles of* HOMER. Latter authors have degraded the character of this hero, by ſuppoſing every part of his body invulnerable except the heel. I know not how often I have heard this urged as one of Homer's abſurdities; and indeed the whole Iliad is one continued abſurdity, on this ſuppoſition. But Homer all along makes his hero equally liable to wounds and death with other men. Nay, to prevent all miſtakes in regard to this matter, (if thoſe who cavil at the poet would but read his work), he actually wounds him in the right arm by the lance of Aſteropæus, in the battle near the river Scamander. See *Iliad*, xxi. ver. 161.—168.

(G) See *Iliad* xxi. 100. and xxiv. 485.—673.——In the firſt of theſe paſſages, Achilles himſelf declares, that before Patroclus was ſlain, he often ſpared the lives of his enemies, and took pleaſure in doing it. It is ſtrange, as Dr Beattie obſerves, that this ſhould be left out in Pope's Tranſlation.

Beattie, ut ſupra.

nate, and vain of his dreſs and perſon, is, however, good-natured, patient of reproof, not deſtitute of courage, and eminently ſkilled in muſic and other fine arts.——Ajax is a huge giant; fearleſs rather from inſenſibility to danger, and confidence in his maſſy arms, than from any nobler principle; boaſtful and rough; regardleſs of the gods, though not downright impious: yet there is in his manner ſomething of frankneſs and blunt ſincerity, which entitle him to a ſhare in our eſteem; and he is ever ready to aſſiſt his countrymen, to whom he renders good ſervice on many a perilous emergency.——The character of Helen, in ſpite of her faults, and of the many calamities whereof ſhe is the guilty cauſe, Homer has found means to recommend to our pity, and almoſt to our love; and this he does, without ſeeking to extenuate the crime of Paris, of which the moſt reſpectable perſonages in the poem are made to ſpeak with becoming abhorrence. She is ſo full of remorſe, ſo ready on every occaſion to condemn her paſt conduct, ſo affectionate to her friends, ſo willing to do juſtice to every body's merit, and withal ſo finely accompliſhed, that ſhe extorts our admiration, as well as that of the Trojan ſenators.——Menelaus, though ſufficiently ſenſible of the injury he had received, is yet a man of moderation, clemency, and good-nature, a valiant ſoldier, and a moſt affectionate brother: but there is a daſh of vanity in his compoſition, and he entertains rather too high an opinion of his own abilities, yet never overlooks nor undervalues the merit of others.——Priam would claim unreſerved eſteem, as well as pity, if it were not for his inexcuſeable weakneſs, in gratifying the humour, and by indulgence abetting the crimes, of the moſt worthleſs of all his children, to the utter ruin of his people, family, and kingdom. Madame Dacier ſuppoſes, that he had loſt his authority, and was obliged to fall in with the politics of the times: but of this there appears no evidence; on the contrary, he and his unworthy favourite Paris, ſeem to have been the only perſons of diſtinction in Troy who were averſe to the reſtoring of Helen. Priam's foible (if it can be called by ſo ſoft a name), however faulty, is not uncommon, and has often produced calamity both in private and public life. The ſcripture gives a memorable inſtance, in the hiſtory of the good old Eli.——Sarpedon comes nearer a perfect character, than any other of Homer's heroes; but the part he has to act is ſhort. It is a character, which one could hardly have expected in thoſe rude times: a ſovereign prince, who conſiders himſelf as a magiſtrate ſet up by the people for the public good, and therefore bound in honour and gratitude to be himſelf their example, and ſtudy to excel as much in virtue as in rank and authority.——Hector is the favourite of every reader, and with good reaſon. To the trueſt valour he joins the moſt generous patriotiſm. He abominates the crime of Paris: but, not being able to prevent the war, he thinks it his duty to defend his country, and his father and ſovereign, to the laſt. He too, as well as Achilles, foreſees his own death; which heightens our compaſſion, and raiſes our idea of his magnanimity. In all the relations of private life, as a ſon, a father, a huſband, a brother, he is amiable in the higheſt degree; and he is diſtinguiſhed among all the heroes for tenderneſs of affection, gentleneſs of manners, and a pious regard to the duties of religion. One circumſtance of his character, ſtrongly expreſſive of a great and delicate mind, we learn from Helen's lamentation over his dead body, that he was almoſt the only perſon in Troy, who had always treated her with kindneſs, and never uttered one reproachful word to give her pain, nor heard others reproach her without blaming them for it. Some tendency to oſtentation (which, however, may be pardonable in a commander in chief), and temporary fits of timidity, are the only blemiſhes diſcoverable in this hero; whoſe portrait Homer appears to have drawn with an affectionate and peculiar attention.

By aſcribing ſo many amiable qualities to Hector and ſome others of the Trojans, the poet intereſts us in the fate of that people, notwithſtanding our being continually kept in mind that they are the injurious party. And by thus blending good and evil, virtue and frailty, in the compoſition of his characters, he makes them the more conformable to the real appearances of human nature, and more uſeful as examples for our improvement; and at the ſame time, without hurting veriſimilitude, gives every neceſſary embelliſhment to particular parts of his poem, and variety, coherence, and animation, to the whole fable. And it may alſo be obſerved, that tho' ſeveral of his characters are complex, not one of them is made up of incompatible parts: all are natural and probable, and ſuch as we think we have met with, or might have met with, in our intercourſe with mankind.

From the ſame extenſive views of good and evil, in all their forms and combinations, Homer has been enabled to make each of his characters perfectly diſtinct in itſelf, and different from all the reſt; inſomuch, that before we come to the end of the Iliad, we are as well acquainted with his heroes, as with the faces and tempers of our moſt familiar friends. Virgil, by confining himſelf to a few general ideas of fidelity and fortitude, has made his ſubordinate heroes a very good ſort of people; but they are all the ſame, and we have no clear knowledge of any one of them. Achates is faithful, and Gyas is brave, and Cloanthus is brave; and this is all we can ſay of the matter. We ſee theſe heroes at a diſtance, and have ſome notion of their ſhape and ſize; but are not near enough to diſtinguiſh their features; and every face ſeems to exhibit the ſame faint and ambiguous appearance. But of Homer's heroes we know every particular that can be known. We eat, and drink, and talk, and fight with them: we ſee them in action, and out of it; in the field, and in their tents and houſes:—the very face of the country about Troy, we ſeem to be as well acquainted with, as if we had been there. Similar characters there are among theſe heroes, as there are ſimilar faces in every ſociety; but we never miſtake one for another. Neſtor and Ulyſſes are both wiſe, and both eloquent: but the wiſdom of the former ſeems to be the effect of experience; that of the latter, of genius: the eloquence of the one is ſweet and copious, but not always to the purpoſe, and apt to degenerate into ſtory-telling; that of the other is cloſe, emphatical, and perſuaſive, and accompanied with a peculiar modeſty and ſimplicity of manner. Homer's heroes are all valiant; yet each diſplays a modification of valour peculiar to himſelf. One is valiant from principle, another from conſtitution;

Of Poetical Characters.

ſtitution; one is raſh, another cautious; one is impetuous and headſtrong, another impetuous, but tractable; one is cruel, another merciful; one is inſolent and oſtentatious, another gentle and unaſſuming; one is vain of his perſon, another of his ſtrength, and a third of his family.——It would be tedious to give a complete enumeration. Almoſt every ſpecies of the heroic character is to be found in Homer.

The Paradiſe Loſt, though truly Epic, cannot properly be called an *heroic poem;* for the agents in it are not heroes, but beings of a higher order (1). Of theſe the poet's plan did not admit the introduction of many; but moſt of thoſe whom he has introduced, are well characteriſed. We have already ſpoken of his Satan, which is the higheſt imagniable ſpecies of the diabolical character. The inferior ſpecies are well diverſified, and in each variety diſtinctly marked: one is ſlothful, another avaricious, a third ſophiſtical, a fourth furious; and though all are impious, ſome are more outrageouſly and blaſphemouſly ſo than others.——Adam and Eve, in the ſtate of innocence, are characters well imagined, and well ſupported; and the different ſentiments ariſing from difference of ſex, are traced out with inimitable delicacy, and philoſophical propriety. After the fall, he makes them retain the ſame characters, without any other change than what the tranſition from innocence to guilt may be ſuppoſed to produce: Adam has ſtill that pre-eminence in dignity, and Eve in lovelineſs, which we ſhould naturally look for in the father and mother of mankind.——Of the bleſſed ſpirits, Raphael and Michael are well diſtinguiſhed; the one for affability, and peculiar goodwill to the human race; the other for majeſty, but ſuch as commands veneration rather than fear.——We are ſorry to add, that Milton's attempt to ſoar ſtill higher, only ſhows, that he had already ſoared as high, as, without being "blaſted with exceſs of light," it is poſſible for the human imagination to riſe.

From what has been ſaid, it ſeems abundantly evident,—That the end of poetry is to pleaſe; and therefore that the moſt perfect poetry muſt be the moſt pleaſing:—that what is unnatural cannot give pleaſure; and therefore that poetry muſt be according to nature:—that it muſt be either according to real nature, or according to nature ſomewhat different from the reality;—that, if according to real nature, it would give no greater pleaſure than hiſtory, which is a tranſcript of real nature;—that greater pleaſure is, however, to be expected from it, becauſe we grant it ſuperior indulgence, in regard to fiction, and the choice of words;—and, conſequently, that poetry muſt be, not according to real nature, but according to nature improved to that degree which is conſiſtent with probability and ſuitable to the poet's purpoſe.——And hence it is that we call poetry, *An imitation of nature.*——For that which is properly termed *imitation* has always in it ſomething which is not in the original. If the prototype and tranſcript be exactly alike; if there be nothing in the one which is not in the other; we may call the latter a *repreſentation*, a *copy*, a *draught*, or a *picture*, of the former; but we never call it an *imitation*.

Of Poetical Arrangement, &c.

SECT. V. *Of Arrangement, Unity, Digreſſions.—Further remarks on Nature in Poetry.*

13. I. The origin of nations, and the beginnings of great events, are little known, and ſeldom intereſting; whence the firſt part of every hiſtory, compared with the ſequel, is ſomewhat dry and tedious. But a poet muſt, even in the beginning of his work, intereſt the readers, and raiſe high expectation; not by any affected pomp of ſtyle, far leſs by ample promiſes or bold profeſſions; but by ſetting immediately before them ſome incident, ſtriking enough to raiſe curioſity, in regard both to its cauſes and to its conſequences. He muſt therefore take up his ſtory, not at the beginning, but in the middle; or rather, to prevent the work from being too long, as near the end as poſſible; and afterwards take ſome proper opportunity to inform us of the preceding events, in the way of narrative, or by converſation of the perſons introduced, or by ſhort and natural digreſſions.

The action of both the *Iliad* and *Odyſſey* begins about ſix weeks before its concluſion; although the principal events of the war of Troy are to be found in the former; and the adventures of a ten years voyage, followed by the ſuppreſſion of a dangerous domeſtic enemy, in the latter. One of the firſt things mentioned by Homer in the Iliad, is a plague, which Apollo in anger ſent into the Grecian army commanded by Agamemnon and now encamped before Troy. Who this Agamemnon was, and who the Grecians were; for what reaſon they had come hither; how long the ſiege had laſted; what memorable actions had been already performed, and in what condition both parties now were:—all this, and much more, we ſoon learn from occaſional hints and converſations interſperſed through the poem.

In the *Eneid*, which, though it comprehends the tranſactions of ſeven years, opens within a few months of the concluding event, we are firſt preſented with a view of the Trojan fleet at ſea, and no leſs a perſon than Juno intereſting herſelf to raiſe a ſtorm for their deſtruction. This excites a curioſity to know ſomething further: who theſe Trojans were; whence they had come, and whither they were bound; why they had left their own country, and what had befallen them ſince they left it. On all theſe points, the poet, without quitting the track of his narrative, ſoon gives the fulleſt information: The ſtorm riſes; the Trojans are driven to Africa, and hoſpitably received by the queen of the country; at whoſe deſire their commander relates his adventures.

The action of *Paradiſe Loſt* commences not many days before Adam and Eve are expelled from the garden of Eden, which is the concluding event. This poem, as its plan is incomparably more ſublime and more important than that of either the Iliad or Eneid, opens with a far more intereſting ſcene: a multitude of angels and archangels ſhut up in a region of torment and darkneſs, and rolling on a lake of unquenchable

---

(1) Samſon, in the *Agoniſtes*, is a ſpecies of the heroic character not to be found in Homer; diſtinctly marked, and admirably ſupported. And Delilah, in the ſame tragedy, is perhaps a more perfect model of an alluring, inſinuating, worthleſs woman, than an other to be met with in ancient or modern poetry.

able fire. Who theſe angels are, and what brought them into this miſerable condition, we naturally wiſh to know; and the poet in due time informs us; partly from the converſation of the fiends themſelves; and more particularly by the mouth of a happy ſpirit, ſent from heaven to caution the father and mother of mankind againſt temptation, and confirm their good reſolutions by unfolding the dreadful effects of impiety and diſobedience.

Beattie, ut ſupra.

This poetical arrangement of events, ſo different from the hiſtorical, has other advantages beſides thoſe ariſing from brevity, and compactneſs of detail: it is obviouſly more affecting to the fancy, and more alarming to the paſſions; and, being more ſuitable to the order and the manner in which the actions of other men ſtrikes our ſenſes, is a more exact imitation of human affairs. I hear a ſudden noiſe in the ſtreet, and run to ſee what is the matter. An inſurrection has happened, a great multitude is brought together, and ſomething very important is going forward. The ſcene before me is the firſt thing that engages my attention; and is in itſelf ſo intereſting, that for a moment or two I look at it in ſilence and wonder. By and by, when I get time for reflection, I begin to inquire into the cauſe of all this tumult, and what it is the people would be at; and one who is better informed than I, explains the affair from the beginning; or perhaps I make this out for myſelf, from the words and actions of the perſons principally concerned.—This is a ſort of picture of poetical arrangement, both in epic and dramatic compoſition; and this plan has been followed in narrative odes and ballads both ancient and modern.—The hiſtorian purſues a different method. He begins perhaps with an account of the manners of a certain age, and of the political conſtitution of a certain country; then introduces a particular perſon, gives the ſtory of his birth, connections, private character, purſuits, diſappointments, and of the events that promoted his views, and brought him acquainted with other turbulent ſpirits like himſelf; and ſo proceeds, unfolding, according to the order of time, the cauſes, principles, and progreſs of the conſpiracy;—if that be the ſubject which he undertakes to illuſtrate. It cannot be denied, that this latter method is more favourable to calm information: but the former, compared with it, will be found to have all the advantages already ſpecified, and to be more effectually productive of that mental pleaſure which depends on the paſſions and imagination.

13. II. If a work have no determinate end, it has no meaning; and if it have many ends, it will diſtract by its multiplicity. Unity of deſign, therefore, belongs in ſome meaſure to all compoſitions, whether in verſe or proſe. But to ſome it is more eſſential than to others; and to none ſo much as to the higher poetry. In certain kinds of hiſtory, there is unity ſufficient, if all the events recorded be referred to one perſon; in others, if to one period of time, or to one people, or even to the inhabitants of one and the ſame planet. But it is not enough, that the ſubject of a poetical fable be the exploits of one perſon; for theſe may be of various and even of oppoſite ſorts and tendencies, and take up longer time than the nature of poetry can admit:—far leſs can a regular poem comprehend the affairs of one period, or of one people:—it muſt be limited to one great action or event, to the illuſtration of which all the ſubordinate events muſt contribute; and theſe muſt be ſo connected with one another, as well as with the poet's general purpoſe, that one cannot be changed, tranſpoſed, or taken away, without affecting the conſiſtence and ſtability of the whole †. In itſelf an incident may be intereſting, a character well drawn, a deſcription beautiful; and yet, if it disfigure the general plan, or if it obſtruct or incumber the main action, inſtead of helping it forward, a correct artiſt would conſider it but as a gaudy ſuperfluity or ſplendid deformity; like a piece of ſcarlet cloth ſewed upon agarment of a different colour *. Not that all the parts of the fable either are, or can be, equally eſſential. Many deſcriptions and thoughts, of little conſequence to the plan, may be admitted for the ſake of variety; and the poet may, as well as the hiſtorian and philoſopher, drop his ſubject for a time, in order to take up an affecting or inſtructive digreſſion.

14. III. The doctrine of poetical digreſſions and epiſodes has been largely treated by the critics. We ſhall here only remark, that, in eſtimating their propriety, three things are to be attended to: —their connection with the fable or ſubject;—their own peculiar excellence;—and their ſubſerviency to the poet's deſign.

(1.) Thoſe digreſſions, that both ariſe from and terminate in the ſubject; like the epiſode of the angel Raphael in Paradiſe Loſt, and the tranſition to the death of Ceſar and the civil wars in the firſt book of the Georgic; are the moſt artful, and, if ſuitably executed, claim the higheſt praiſe:—thoſe that ariſe from, but do not terminate in, the ſubject, are perhaps ſecond in the order of merit; like the ſtory of Dido in the Eneid, and the encomium on a country-life in the ſecond book of the Georgic:—thoſe come next, that terminate in, but do not riſe from, the fable; of which there are ſeveral in the third book of the Eneid, and in the Odyſſey:—and thoſe, that neither terminate in the fable, nor riſe from it, are the leaſt artful; and if they be long, cannot eſcape cenſure, unleſs their beauty be very great.

But (2.) we are willing to excuſe a beautiful epiſode, at whatever expence to the ſubject it may be introduced. They who can blame Virgil for obtruding upon them the charming tale of Orpheus and Eurydice in the fourth Georgic, or Milton for the apoſtrophe to light in the beginning of his third book, ought to forfeit all title to the peruſal of good poetry; for of ſuch divine ſtrains one would rather be the author, than of all the books of criticiſm in the world. Yet ſtill it is better, that an epiſode poſſeſs the beauty of connection, together with its own intrinſic elegance, than this without the other.

Moreover, in judging of the propriety of epiſodes, and other ſimilar contrivances, it may be expedient to attend, (3.) to the deſign of the poet, as diſtinguiſhed from the fable or ſubject of the poem. The great deſign, for example, of Virgil, was to intereſt his countrymen in a poem written with a view to reconcile them to the perſon and government of Auguſtus. Whatever, therefore, in the poem tends to promote this deſign, even though it ſhould, in ſome degree, hurt the contexture of the fable, is really a proof of the poet's judgment; and may be not only allowed, but applauded.——The progreſs of the action of the Eneid may ſeem to be too long obſtructed in one place, by the ſtory of Dido, which, though it riſes from the preceding part of the poem, has no influence upon the ſequel; and, in another, by the epiſode of Cacus, which, without injury to the fable, might have been omitted altogether. Yet theſe epiſodes, intereſting as they are to us and all mankind, becauſe of the tranſcendent merit of the poetry, muſt have been ſtill more intereſting to the Romans, becauſe of their connection with the Roman affairs: for the one accounts poetically for their wars with Carthage; and the other not only explains ſome of their religious ceremonies, but alſo gives a moſt charming rural picture of thoſe hills and valleys in the neighbourhood of the Tiber, on which, in after times, their majeſtic city was fated to ſtand.—And if we conſider, that the deſign of Homer's Iliad was, not only to ſhow the fatal effects of diſſenſion among confederates, but alſo to immortaliſe his country, and celebrate the moſt diſtinguiſhed families in it, we ſhall be inclined to think more favourably than critics generally do, of ſome of his long ſpeeches and digreſſions; which, though to us they may ſeem trivial, muſt have been very intereſting to his countrymen, on account of the genealogies and private hiſtory recorded in them.——Shakeſpeare's hiſtorical plays, conſidered as dramatic fables, and tried by the laws of tragedy and comedy, appear very rude compoſitions. But if we attend to the poet's deſign, (as the elegant critic † has with equal truth and beauty explained it), we ſhall be forced to admire his judgment in the general conduct of thoſe pieces, as well as unequalled ſucceſs in the execution of particular parts.

---

† *Ariſt. Poet.* § 8.

* *Hor. Ar. Poet.* v. 15, *&c.*

There is yet another point of view in which theſe digreſſions may be conſidered. If they tend to elucidate any important character, or to introduce any intereſting event not otherwiſe within the compaſs of the poem, or to give an amiable diſplay of any particular virtue, they may be intitled, not to our pardon only, but even to our admiration, however looſely they may hang upon the fable. All theſe three ends are effected by that moſt beautiful epiſode of Hector and Andromache in the ſixth book of the Iliad; and the two laſt, by the no leſs beautiful one of Euryalus and Niſus, in the ninth of the Eneid.

15. IV. And now, from the poſition formerly eſtabliſhed, that the end of this divine art is to give pleaſure, it has been endeavoured to prove, that, whether in diſplaying the appearances of the material univerſe, or in imitating the workings of the human mind, and the varieties of human character, or in arranging and combining into one whole the ſeveral incidents and parts whereof his fable conſiſts,—the aim of the poet muſt be, to copy nature, not as it is, but in that ſtate of perfection in which, conſiſtently with the particular genius of the work, and the laws of veriſimilitude, it may be ſuppoſed to be.

Such, in general, is the nature of that poetry which is intended to raiſe admiration, pity, and other ſerious emotions. But in this art, as in all others, there are different degrees of excellence; and we have hitherto directed our view chiefly to the higheſt. All ſerious poets are not equally ſolicitous to improve nature. Euripides is ſaid to have repreſented men as they were; Sophocles, more poetically, as they ſhould or might be *. Theocritus in his Idyls, and Spenſer in his Shepherd's Calendar, give us language and ſentiments more nearly approaching thoſe of the *Rus verum et barbarum* †, than what we meet with in the Paſtorals of Virgil and Pope. In the hiſtorical drama, human characters and events muſt be according to hiſtorical truth, or at leaſt not ſo remote from it as to lead into any important miſapprehenſion of fact. And in the hiſtorical epic poem, ſuch as the Pharſalia of Lucan, and the Campaign of Addiſon, the hiſtorical arrangement is preferred to the poetical, as being nearer the truth. Yet nature is a little improved even in theſe poems. The perſons in Shakeſpeare's hiſtorical plays, and the heroes of the Pharſalia, talk in verſe, and ſuitably to their characters, and with a readineſs, beauty, and harmony of expreſſion, not to be met with in real life, nor even in hiſtory: ſpeeches are invented, and, to heighten the deſcription, circumſtances added, with great latitude: real events are rendered more compact and more ſtrictly dependent upon one another; and fictitious ones brought in, to elucidate human characters, and diverſify the narration.

The more poetry improves nature, by copying after general ideas collected from extenſive obſervation, the more it partakes (according to Ariſtotle) of the nature of philoſophy; the greater ſtretch of fancy and of obſervation it requires in the artiſt, and the better chance it has to be univerſally agreeable.

Yet poetry, when it falls ſhort of this perfection, may have great merit as an inſtrument of both inſtruction and pleaſure. To moſt men, ſimple unadorned nature is, at certain times, and in certain compoſitions, more agreeable than the moſt elaborate improvements of art; as a plain ſhort period, without modulation, gives a pleaſing variety to a diſcourſe. Many ſuch portraits of ſimple nature there are in the ſubordinate parts both of Homer's and of Virgil's poetry: and an excellent effect they have in giving probability to the fiction, as well as in gratifying the reader's fancy with images diſtinct and lively, and eaſily comprehended. The hiſtorical plays of Shakeſpeare raiſe not our pity and terror to ſuch a height, as Lear, Macbeth, or Othello; but they intereſt and inſtruct us greatly, notwithſtanding. The rudeſt of the eclogues of Theocritus, or even of Spenſer, have by ſome authors been extolled above thoſe of Virgil, becauſe more like real life. Nay, Corneille is known to have preferred the Pharſalia to the Eneid, perhaps from its being nearer the truth, or perhaps from the ſublime ſentiments of Stoical morality ſo forcibly and ſo oſtentatiouſly diſplayed in it.

Poets may refine upon nature too much as well as too little; for affectation and ruſticity are equally remote from true elegance. The ſtyle and ſentiments of comedy ſhould no doubt be more correct and more pointed than thoſe of the moſt polite converſation: but to make every footman a wit, and every gentleman and lady an epigrammatiſt, as Congreve has done, is an exceſſive and faulty refinement. The proper medium has been hit by Menander and Terence, by Shakeſpeare in his happier ſcenes, and by Garrick, Cumberland, and ſome others of late renown. To deſcribe the paſſion of love with as little delicacy as ſome men ſpeak of it, would be unpardonable; but to transform it into mere Platonic adoration, is to run into another extreme, leſs criminal indeed, but too remote

---

† Eſſays on the writings and genius of Shakeſpeare, p. 55.

* Ariſt. Poet.

† Martial.

Of Poetical Language.

mote from univerſal truth to be univerſally intereſting. To the former extreme Ovid inclines; and Petrarch, and his imitators, to the latter. Virgil has happily avoided both: but Milton has painted this paſſion, as diſtinct from all others, with ſuch peculiar truth and beauty, that we cannot think Voltaire's encomium too high, when he ſays, that love in all other poetry ſeems a weakneſs, but in Paradiſe Loſt a virtue. There are many good ſtrokes of nature in Ramſay's Gentle Shepherd; but the author's paſſion for the *rus verum* betrays him into ſome indelicacies: a cenſure that falls with greater weight upon Theocritus, who is often abſolutely indecent. The Italian paſtoral of Taſſo and Guarini, and the French of Fontenelle, run into the oppoſite extreme, (though in ſome parts beautifully ſimple), and diſplay a ſyſtem of rural manners ſo quaint and affected as to outrage all probability. In fine, though mediocrity of execution in poetry be allowed to deſerve the doom pronounced upon it by Horace; yet is it true, notwithſtanding, that in this art, as in many other good things, the point of excellence lies in a middle between two extremes; and has been reached by thoſe only who ſought to improve nature as far as the genius of their work would permit, keeping at an equal diſtance from ruſticity on the one hand, and affected elegance on the other.

Sect. VI. *Of Poetical Language.*

16. Words in poetry are choſen, firſt, for their *ſenſe*; and, ſecondly, for their *ſound*. That the firſt of theſe grounds of choice is the more excellent, nobody can deny. He who in literary matters prefers ſound to ſenſe, is a fool. Yet ſound is to be attended to, even in proſe; and in verſe demands particular attention. We ſhall conſider poetical language, firſt, as SIGNIFICANT; and, ſecondly, as SUSCEPTIBLE OF HARMONY.

§ 1. *Of Poetical Language, conſidered as* SIGNIFICANT.

17. If, as it has been endeavoured to prove, poetry be imitative of nature, poetical fictions of real events, poetical images of real appearances in the viſible creation, and poetical perſonages of real human characters; it would ſeem to follow, that the *language of poetry* muſt be an imitation of the *language of nature*.

According to Dr Beattie†, that language is natural, when it is ſuited to the ſpeaker's condition, character, and circumſtances. And as, for the moſt part, the images and ſentiments of ſerious poetry are copied from the images and ſentiments, not of real, but of improved, nature; ſo the language of ſerious poetry muſt (as hinted already) be a tranſcript, not of the real language of nature, which is often diſſonant and rude, but of natural language improved as far as may be conſiſtent with probability, and with the ſuppoſed character of the ſpeaker. If this be not the caſe, if the language of poetry be ſuch only as we hear in converſation, or read in hiſtory, it will, inſtead of delight, bring diſappointment: becauſe it will fall ſhort of what we expect from an art which is recommended rather by its pleaſurable qualities, than by its intrinſic utility; and to which, in order to render it pleaſing, we grant higher privileges, than to any other kind of literary compoſition, or any other mode of human language.

Of Poetical Words.

The next inquiry muſt therefore be, "What are thoſe improvements that peculiarly belong to the language of poetry?" And theſe may be comprehended under two heads; *poetical words*, and *tropes and figures*.

Art. I. Of Poetical Words.

18. One mode of improvement peculiar to poetical diction reſults from the uſe of thoſe words, and phraſes, which, becauſe they rarely occur in proſe, and frequently in verſe, are by the grammarian and lexicographer termed *poetical*. In theſe ſome languages abound more than others: but no language, perhaps, is altogether without them; and perhaps no language can be ſo, in which any number of good poems have been written. For poetry is better remembered than proſe, eſpecially by poetical authors; who will always be apt to imitate the phraſeology of thoſe they have been accuſtomed to read and admire: and thus, in the works of poets, down through ſucceſſive generations, certain phraſes may have been conveyed, which, though originally perhaps in common uſe, are now confined to poetical compoſition. Proſe-writers are not ſo apt to imitate one another, at leaſt in words and phraſes, both becauſe they do not ſo well remember one another's phraſeology, and alſo becauſe their language is leſs artificial, and muſt not, if they would make it eaſy and flowing, (without which it cannot be elegant), depart eſſentially from the ſtyle of correct converſation. Poets too, on account of the greater difficulty of their numbers, have, both in the choice and in the arrangement of words, a better claim to indulgence, and ſtand more in need of a diſcretionary power.

The language of Homer differs materially from what was written and ſpoken in Greece in the days of Socrates. It differs in the mode of inflection, it differs in the ſyntax, it differs even in the words: ſo that one might read Homer with eaſe, who could not read Xenophon; or Xenophon, without being able to read Homer. Yet we cannot believe that Homer, or the firſt Greek poet who wrote in his ſtyle, would make choice of a dialect quite different from what was intelligible in his own time: for poets have in all ages written with a view to be read, and to be read with pleaſure; which they could not be, if their diction were hard to be underſtood. It is more reaſonable to ſuppoſe, that the language of Homer is according to ſome ancient dialect, which, though not perhaps in familiar uſe among the Greeks at the time he wrote, was however intelligible. From the Homeric to the Socratic age, a period had elapſed of no leſs than 400 years; during which the ſtyle both of diſcourſe and of writing muſt have undergone great alterations. Yet the Iliad continued the ſtandard of heroic poetry, and was conſidered as the very perfection of poetical language; notwithſtanding that ſome words in it were become ſo antiquated, or ſo ambiguous, that Ariſtotle himſelf ſeems to have been ſomewhat doubtful in regard to their meaning*. And if Chaucer's merit as a poet had been as great as Homer's, and the Engliſh tongue under Edward III. as perfect as the Greek was in the ſecond century after the Trojan war, the ſtyle of Chaucer would probably have been our model for poetical diction at this day; even as Petrarch, his contemporary, is ſtill imitated by the beſt poets of Italy.

---

† *Eſſays*, Part ii. chap. 1.

* Poetic. cap. 25.

The rudeneſs of the ſtyle of Ennius has been imputed by the old critics to his having copied too cloſely the dialect of common life. But this appears to be a miſtake. For if we compare the fragments of that author with the comedies of Plautus, who flouriſhed in the ſame age, and whoſe language was certainly copied from that of common life, we ſhall be ſtruck with an air of antiquity in the former that is not in the latter. Ennius, no doubt, like moſt other ſublime poets, affected ſomething of the antique in his expreſſion: and many of his words and phraſes, not adopted by any proſe-writer now extant, are to be found in Lucretius and Virgil, and were by them tranſmitted to ſucceeding poets. Theſe form part of the Roman poetical dialect; which appears from the writings of Virgil, where we have it in perfection, to have been very copious. The ſtyle of this charming poet is indeed ſo different from proſe, and is altogether ſo peculiar, that it is perhaps impoſſible to analyſe it on the common principles of Latin grammar. And yet no author can be more perſpicuous or more expreſſive; notwithſtanding the frequency of Greciſm in his ſyntax, and his love of old words, which he, in the judgment of Quintilian, knew better than any other man how to improve into decoration *.

The poetical dialect of modern Italy is ſo different from the proſaic, that perſons who can read the hiſtorians, and even ſpeak with tolerable fluency the language of that country, may yet find it difficult to conſtrue a page of Petrarch or Taſſo. Yet it is not probable, that Petrarch, whoſe works are a ſtandard of the Italian poetical diction †, made any material innovations in his native tongue. It is rather probable that he wrote it nearly as it was ſpoken in his time, that is, in the 14th century; omitting only harſh combinations, and taking that liberty which Homer probably, and Virgil certainly, took before him, of reviving ſuch old, but not obſolete expreſſions, as ſeemed peculiarly ſignificant and melodious; and poliſhing his ſtyle to that degree of elegance which human ſpeech, without becoming unnatural, may admit of, and which the genius of poetry, as an art ſubſervient to pleaſure, may be thought to require.

The French poetry in general is diſtinguiſhed from proſe rather by the rhime and the meaſure, than by any old or uncommon phraſeology. Yet the French, on certain ſubjects, imitate the ſtyle of their old poets, of Marot in particular; and may therefore be ſaid to have ſomething of a poetical dialect, though far leſs extenſive than the Italian, or even than the Engliſh. And it may be preſumed, that in future ages they will have more of this dialect than they have at preſent. This may be inferred from the very uncommon merit of ſome of their late poets, particularly Boileau and La Fontaine, who, in their reſpective departments, will continue to be imitated, when the preſent modes of French proſe are greatly changed: an event that, for all the pains they take to preſerve their language, muſt inevitably happen, and whereof there are not wanting ſome preſages already.

The Engliſh poetical dialect is not characteriſed by any peculiarities of inflection, nor by any great latitude in the uſe of foreign idioms. More copious it is, however, than one would at firſt imagine; as may appear from the following ſpecimen and obſervations.

(1.) A few Greek and Latin idioms are common in Engliſh poetry, which are ſeldom or never to be met with in proſe. QUENCHED OF HOPE. Shakeſpeare.—SHORN OF HIS BEAMS. Milton.—*Created thing* NOR VALUED HE NOR SHUN'D. Milton.—*'Tis thus we riot, while* WHO SOW IT STARVE. Pope.—*This day* BE BREAD AND PEACE MY LOT. Pope.—INTO WHAT PIT THOU SEE'ST FROM WHAT HEIGHT FALLEN. Milton. *He deceived The mother of mankind,* WHAT TIME HIS PRIDE HAD CAST HIM *out of heaven.* Milton.——Some of theſe, with others to be found in Milton, ſeem to have been adopted for the ſake of brevity, which in the poetical tongue is indiſpenſable. For the ſame reaſon, perhaps the articles *a* and *the* are ſometimes omitted by our poets, though leſs frequently in ſerious than burleſque compoſition.——In Engliſh, the adjective generally goes before the ſubſtantive, the nominative before the verb, and the active verb before (what we call) the accuſative. Exceptions, however, to this rule, are not uncommon even in proſe. But in poetry they are more frequent. *Their homely joys, and* DESTINY OBSCURE. *Now fades the glimmering landſcape on the ſight; and all the air a ſolemn ſtillneſs holds.* In general, that verſification may be leſs difficult, and the cadence more uniformly pleaſing; and ſometimes, too, in order to give energy to expreſſion, or vivacity to an image;—the Engliſh poet is permitted to take much greater liberties than the proſe-writer, in arranging his words, and modulating his lines and periods. Examples may be ſeen in every page of Paradiſe Loſt.

(2.) Some of our poetical words take an additional ſyllable, that they may ſuit the verſe the better; as, *diſpart, diſtain, diſport, affright, enchain,* for part, ſtain, ſport, fright, chain. Others ſeem to be nothing elſe than common words made ſhorter, for the convenience of the verſifier. Such are, *auxiliar, ſublunar, trump, vale, part, clime, ſubmiſs, frolic, plain, drear, dread, helm, morn, mead, eve* and *even, gan, illume* and *illumine, ope, hoar, bide, ſwage, ſcape*; for auxiliary, ſublunary, trumpet, valley, depart, climate, ſubmiſſive, frolicſome, complain, dreary, dreadful, helmet, morning, meadow, evening, began or began to, illuminate, open, hoary, abide, aſſuage, eſcape.——Of ſome of theſe the ſhort form is the more ancient. In Scotland, *even, morn, bide, ſwage,* are ſtill in vulgar uſe; but *morn*, except when contradiſtinguiſhed to *even*, is ſynonimous, not with *morning* (as in the Engliſh poetical dialect), but with *morrow*.—The Latin poets, in a way ſomewhat ſimilar, and perhaps for a ſimilar reaſon, ſhortened *fundamentum, tutamentum, munimentum,* &c. into fundamen, tutamen, munimen.

(3.) Of the following words, which are now almoſt peculiar to poetry, the greater part are ancient, and were once no doubt in common uſe in England, as many of them ſtill are in Scotland. *Afield, amain, annoy* (a noun), *anon, aye* (ever), *beheſt, blithe, brand* (ſword), *bridal, carol, dame* (lady), *featly, fell* (an adjective), *gaude, gore, hoſt* (army), *lambkin, late* (of late), *lay* (poem), *lea, glade, gleam, hurl, lore, meed, oriſons, plod* (to travel laboriouſly), *ringlet, rue* (a

---

* *Inſtit.* viii. 3. § 3.

† *Vicende ella litera- ura del De- ina,* cap. 4.

Poetic. ap. 25.

Of Poetical Words.

(a verb), *ruth*, *ruthleſs*, *ſojourn* (a noun), *ſmite*, *ſpeed* (an active verb), *ſave* (except), *ſpray* (twig), *ſteed*, *ſtrain* (ſong), *ſtrand*, *ſwain*, *thrall*, *thrill*, *trail* (a verb), *troll*, *wail*, *welter*, *warble*, *wayward*, *woo*, *the while* (in the mean time), *yon*, *of yore*.

(4.) Theſe that follow are alſo poetical; but, ſo far as appears, were never in common uſe. *Appal*, *arrowy*, *attune*, *battailous*, *breezy*, *car* (chariot), *clarion*, *cates*, *courſer*, *darkling*, *flicker*, *floweret*, *emblaze*, *gairiſh*, *circlet*, *impearl*, *nightly*, *noiſeleſs*, *pinion* (wing), *ſhadowy*, *ſlumberous*, *ſtreamy*, *troublous*, *wilder* (a verb), *ſhrill* (a verb), *ſhook* (ſhaken), *madding*, *viewleſs*.—The following too derived from the Greek and Latin, ſeem, peculiar to poetry. *Clang*, *clangor*, *choral*, *bland boreal*, *dire*, *enſanguined*, *ire*, *ireful*, *lave* (to waſh), *nymph* (lady, girl), *orient*, *panoply*, *philomel*, *infuriate*, *jocund*, *radiant*, *rapt*, *redolent*, *refulgent*, *verdant*, *vernal*, *zephyr*, *zone* (girdle), *ſylvan*, *ſuffuſe*.

(5.) In moſt languages, the rapidity of pronunciation abbreviates ſome of the commoneſt words, or even joins two, or perhaps more, of them, into one; and ſome of thoſe abbreviated forms find admiſſion into writing. The Engliſh language was quite diſfigured by them in the end of the laſt century; but Swift, by his ſatire and example, brought them into diſrepute: and, though ſome of them be retained in converſation, as *don't*, *ſhan't*, *can't*, they are now avoided in ſolemn ſtyle; and by elegant writers in general, except where the colloquial dialect is imitated, as in comedy. *'Tis* and *'twas*, ſince the time of Shafteſbury, ſeem to have been daily loſing credit, at leaſt in proſe; but ſtill have a place in poetry, perhaps becauſe they contribute to conciſeneſs. *'Twas on a lofty vaſe's ſide.* Gray. *'Tis true, 'tis certain, man though dead, retains Part of himſelf.* Pope. In verſe too, *over* may be ſhortened into *o'er*, (which is the Scotch, and probably was the old Engliſh, pronunciation); *never* into *ne'er*; and from *the* and *to*, when they go before a word beginning with a vowel, the final letter is ſometimes cut off. *O'er hills, o'er dales, o'er crags, o'er rocks they go.* Pope. *Where'er ſhe turns, the Graces homage pay. And all that beauty, all that wealth e'er gave. Rich with the ſpoils of time did ne'er unroll.* Gray. *T' alarm th' eternal midnight of the grave.*—— Theſe abbreviations are now peculiar to the poetical tongue, but not neceſſary to it. They ſometimes promote brevity, and render verſification leſs difficult.

(6.) Thoſe words which are commonly called *compound epithets*, as *roſy-finger'd*, *roſy-boſom'd*, *many-twinkling*, *many-ſounding*, *moſs-grown*, *bright-eyed*, *ſtraw-built*, *ſpirit-ſtirring*, *incenſe-breathing*, *heaven-taught*, *love-whiſpering*, *lute-reſounding*, are alſo to be conſidered as part of our poetical dialect. It is true, we have compounded adjectives in familiar uſe, as *high-ſeaſoned*, *well-natured*, *ill-bred*, and innumerable others. But we ſpeak of thoſe that are leſs common, that ſeldom occur except in poetry, and of which in proſe the uſe would appear affected. And that they ſometimes promote brevity and vivacity of expreſſion, cannot be denied. But, as they give, when too frequent, a ſtiff and finical air to a performance; as they are not always explicit in the ſenſe, nor agreeble in the ſound; as they are apt to produce a confuſion, or too great a multiplicity, of images; as they tend to disfigure the language, and furniſh a pretext for endleſs innovation; they ought to be uſed ſparingly; and thoſe only uſed, which the practice of popular authors has rendered familiar to the ear, and which are in themſelves peculiar emphatical and harmonious.

Of Poetical Words.

(7.) In the transformation of nouns into verbs and participles, our poetical dialect admits of greater latitude than proſe. Hymn, pillow, curtain, ſtory, pillar, picture, peal, ſurge, cavern, honey, career, cincture, boſom, ſphere, are common nouns; but *to hymn*, *to pillow*, *curtained*, *pillared*, *pictured*, *pealing*, *ſurging*, *cavern'd*, *honied*, *careering*, *cinctured*, *boſomed*, *ſphered*, would appear affected in proſe, though in verſe they are warranted by the very beſt authority.

Some late poets, particularly the imitators of Spenſer, have introduced a great variety of uncommon words, as certes, eftſoons, ne, whilom, tranſmew, moil, fone, loſel, albe, hight, dight, pight, thews, couthful, aſſot, muchel, wend, arrear, &c. Theſe were once poetical words, no doubt; but they are now obſolete, and to many readers unintelligible. No man of the preſent age, however converſant in this dialect, would naturally expreſs himſelf in it on any intereſting emergence; or, ſuppoſing this natural to the antiquarian, it would never appear ſo to the common hearer or reader. A mixture of theſe words, therefore, muſt ruin the pathos of modern language; and as they are not familiar to our ear, and plainly appear to be ſought after and affected, will generally give a ſtiffneſs to modern verſification. Yet in ſubjects approaching to the ludicrous they may have a good effect; as in the *Schoolmiſtreſs* of Shenſtone, Parnel's Fairy-tale, Thomſon's Caſtle of Indolence, and Pope's lines in the Dunciad upon Wormius. But this effect will be moſt pleaſing to thoſe who have leaſt occaſion to recur to the gloſſary.

Indeed, it is not always eaſy to fix the boundary between poetical and obſolete expreſſions. To many readers, *lore*, *meed*, *beheſt*, *blithe*, *gaude*, *ſpray*, *thrall*, may already appear antiquated; and to ſome the ſtyle of Spenſer, or even of Chaucer, may be as intelligible as that of Dryden. This however we may venture to affirm, that a word, which the majority of readers cannot underſtand without a gloſſary, may with reaſon be conſidered as obſolete; and ought not to be uſed in modern compoſition, unleſs revived, and recommended to the public ear, by ſome very eminent writer. There are but few words in Milton, as *nathleſs*, *tine*, *frore*, *boſky*, &c.; there are but one or two in Dryden, as *falſify* (D); and in Pope, there are none at all, which every reader of our poetry may not be ſuppoſed to underſtand: whereas in Shakeſpeare there are many, and in Spenſer many more, for which one who knows Engliſh very well may be obliged to conſult the dictionary. The practice of Milton, Dryden, or Pope, may therefore, in almoſt all caſes, be admitted as good authority for the uſe of a poetical word. And in them, all the words above enumerated, as poetical, and in preſent uſe, may actually be found. And of ſuch poets as may chooſe to obſerve this

---

(D) Dryden in one place (Eneid ix. verſ. 1095.) uſes *Falſified* to denote *Pierced through and through.* He acknowledges, that this uſe of the word is an innovation; and has nothing to plead for it but his own authority, and that *Falſare* in Italian ſometimes means the ſame thing.

this rule, it will not be ſaid, either that they reject the judgment of Quintilian, who recommends the neweſt of the old words, and the oldeſt of the new, or that they are unattentive to Pope's precept;

> Be not the firſt by whom the new are tried.
> Nor yet the laſt to lay the old aſide.
> *Eſſ. on Crit.* v. 335.

We muſt not ſuppoſe, that theſe poetical words never occur at all except in poetry. Even from converſation they are not excluded: and the ancient critics allow, that they may be admitted into proſe; where they occaſionally confer dignity upon a ſublime ſubject, or heighten the ludicrous qualities of a mean one. But it is in poetry only, where the frequent uſe of them does not ſavour of affectation.

Nor muſt we ſuppoſe them eſſential to this art. Many paſſages there are of exquiſite poetry, wherein not a ſingle phraſe occurs that might not be uſed in proſe. In fact, the influence of theſe words in adorning Engliſh verſe is not very extenſive. Some influence however they have. They ſerve to render the poetical ſtyle, firſt, more melodious; and, ſecondly, more ſolemn.

Firſt, They render the poetical ſtyle more melodious, and more eaſily reducible into meaſure. Words of unwieldy ſize, or difficult pronunciation, are never uſed by correct poets, where they can be avoided: unleſs in their ſound they have ſomething imitative of the ſenſe. Homer's poetical inflections contribute wonderfully to the ſweetneſs of his numbers: and if the reader is pleaſed to look back to the ſpecimen above given of the Engliſh poetical dialect, he will find that the words are in general well-ſounding, and ſuch as may coaleſce with other words, without producing harſh combinations. Quintilian obſerves, that poets, for the ſake of their verſe, are indulged in many liberties, not granted to the orator, of lengthening, ſhortening, and dividing their words *:—and if the Greek and Roman poets claimed this indulgence from neceſſity, and obtained it, the Engliſh, thoſe of them eſpecially who write in rhyme, may claim it with better reaſon; as the words of their language are leſs muſical, and far leſs ſuſceptible of variety in arrangement and ſyntax.

Secondly, Such poetical words as are known to be ancient have ſomething venerable in their appearance, and impart a ſolemnity to all around them. This remark is from Quintilian; who adds, that they give to a compoſition that caſt and colour of antiquity, which in painting is ſo highly valued, but which art can never effectually imitate †. Poetical words that are either not ancient, or not known to be ſuch, have, however, a pleaſing effect from aſſociation. We are accuſtomed to meet with them in ſublime and elegant writing; and hence they come to acquire ſublimity and elegance: Even as the words we hear on familiar occaſions come to be accounted familiar; and as thoſe that take their riſe among pick-pockets, gamblers, and gypſies, are thought too indelicate to be uſed by any perſon of taſte or good-manners. When one hears the following lines, which abound in poetical words,

> The breezy call of incenſe-breathing morn,
> The ſwallow twittering from the ſtraw-built ſhed,
> The cock's ſhrill clarion, or the echoing horn,
> No more ſhall rouſe them from their lowly bed:

—one is as ſenſible of the dignity of the language; as one would be of the vileneſs or vulgarity of that man's ſpeech, who ſhould prove his acquaintance with Bridewell, by interlarding his diſcourſe with ſuch terms as *mill-doll*, *queer cull*, or *nubbing cheat* †; or who, in imitation of fops and gamblers, ſhould, on the common occaſions of life, talk of being *beat hollow*, or *ſaving his diſtance* ‡.—What gives dignity to perſons gives dignity to language. A man of this character is one who has borne important employments, been connected with honourable aſſociates, and never degraded himſelf by levity or immorality of conduct. Dignified phraſes are thoſe which have been uſed to expreſs elevated ſentiments, have always made their appearance in elegant compoſition, and have never been profaned by giving permanency or utterance to the paſſions of the vile, the giddy, or the worthleſs. And as by an active old age, the dignity of ſuch men is confirmed and heightened; ſo the dignity of ſuch words, if they be not ſuffered to fall into diſuſe, ſeldom fails to improve by length of time.

Art 2. *Of* Tropes and Figures.

19. If it appear, that, by means of figures, language may be made more *pleaſing*, and more *natural*, than it would be without them; it will follow, that to poetic language, whoſe end is to *pleaſe* by imitating *nature*, figures muſt be not only ornamental, but neceſſary. It will here be proper, therefore, firſt to point out the importance and utility of figurative language; ſecondly, to ſhow, that figures are more neceſſary to poetry in general, than to any other mode of writing.

I. *As to the importance and utility of figurative expreſſion*, in making language more pleaſing and more natural; it may be remarked,

(1.) That tropes and figures are often neceſſary to ſupply the unavoidable defects of language. When *proper* words are wanting, or not recollected, or when we do not chooſe to be always repeating them, we muſt have recourſe to tropes and figures.—When philoſophers began to explain the operations of the mind, they found, that moſt of the words in common uſe, being framed to anſwer the more obvious exigencies of life, were in their proper ſignification applicable to matter only and its qualities. What was to be done in this caſe? Would they think of making a new language to expreſs the qualities of mind? No: that would have been difficult, or impracticable; and granting it both practicable and eaſy, they muſt have foreſeen, that nobody would read or liſten to what was thus ſpoken or written, in a new, and conſequently in an unknown, tongue. They therefore took the language as they found it; and, wherever they thought there was a ſimilarity or analogy between the qualities of the mind and the qualities of matter, ſcrupled not to uſe the names of the material qualities tropically, by applying them to the mental qualities. Hence came the phraſes, *ſolidity* of judgment, *warmth* of imagination, *enlargement* of underſtanding, and many others; which, though figurative, expreſs the meaning juſt as well as proper words would have done.

---

* *Inſtit. Orat.* lib. 10. cap. 1. § 3.

† Lib. 8. p. 3. § 3.

† See the *Scoundrel's Dictionary.*

‡ Language of New-market.

In fact, numerous as the words in every language are, they muſt always fall ſhort of the unbounded variety of human thoughts and perceptions. Taſtes and ſmells are almoſt as numerous as the ſpecies of bodies. Sounds admit of perceptible varieties that ſurpaſs all computation, and the ſeven primary colours may be diverſified without end. If each variety of external perception were to have a name, language would be inſurmountably difficult; nay, if men were to appropriate a claſs of names to each particular ſenſe, they would multiply words exceedingly, without adding any thing to the clearneſs of ſpeech. Thoſe words, therefore, that in their proper ſignification denote the objects of one ſenſe, we often apply tropically to the objects of another, and ſay, Sweet taſte, ſweet ſmell, ſweet ſound; ſharp point, ſharp taſte, ſharp ſound; harmony of ſounds, harmony of colours, harmony of parts; ſoft ſilk, ſoft colour, ſoft ſound, ſoft temper; and ſo in a thouſand inſtances: and yet theſe words, in their tropical ſignification, are not leſs intelligible than in their proper one; for ſharp taſte and ſharp ſound, are as expreſſive as ſharp ſword; and harmony of tones is not better underſtood by the muſician, than harmony of parts by the architect, and harmony of colours by the painter.

Savages, illiterate perſons, and children, have comparatively but few words in proportion to the things they may have occaſion to ſpeak of; and muſt therefore recur to tropes and figures more frequently, than perſons of copious elocution. A ſeaman, or mechanic, even when he talks of that which does not belong to his art, borrows his language from that which does; and this makes his diction figurative to a degree that is ſometimes entertaining enough. "Death (ſays a ſeaman in one of Smollet's novels) has not yet *boarded* my comrade; but they have been *yard-arm and yard-arm* theſe *three glaſſes*. His *ſtarboard* eye is open, but faſt *jammed* in his head; and the *haulyards* of his under jaw have given way." Theſe phraſes are exaggerated; but we allow them to be natural, becauſe we know that illiterate people are apt to make uſe of tropes and figures taken from their own trade, even when they ſpeak of things that are very remote and incongruous. In thoſe poems, therefore, that imitate the converſation of illiterate perſons, as in comedy, farce, and paſtoral, ſuch figures judiciouſly applied may render the imitation more pleaſing, becauſe more exact and natural.

Words that are untuneable and harſh, the poet is often obliged to avoid, when perhaps he has no other way to expreſs their meaning than by tropes and figures; and ſometimes the meaſure of his verſe may oblige him to reject a proper word that is not harſh, merely on account of its being too long, or too ſhort, or in any other way unſuitable to the rhythm, or to the rhime. And hence another uſe of figurative language, that it contributes to poetical harmony. Thus, *to preſs the plain* is frequently uſed to ſignify *to be ſlain in battle*; *liquid plain* is put for *ocean*, *blue ſerene* for *ſky*, and *ſylvan reign* for *country life*.

(2.) Tropes and figures are favourable to delicacy. When the proper name of a thing is in any reſpect unpleaſant, a well-choſen trope will convey the idea in ſuch a way as to give no offence. This is agreeable, and even neceſſary, in polite converſation, and cannot be diſpenſed with in elegant writing of any kind. Many words, from their being often applied to vulgar uſe, acquire a meanneſs that diſqualifies them for a place in ſerious poetry; while perhaps, under the influence of a different ſyſtem of manners, the correſponding words in another language may be elegant, or at leaſt not vulgar. When one reads Homer in the Greek, one takes no offence at his calling Eumeus by a name which, literally rendered, ſignifies *ſwine-herd*; firſt, becauſe the Greek word is well-ſounding in itſelf; ſecondly, becauſe we have never heard it pronounced in converſation, nor conſequently debaſed by vulgar uſe; and, thirdly, becauſe we know, that the office denoted by it was, in the age of Eumeus, both important and honourable. But Pope would have been blamed, if a name ſo indelicate as *ſwine-herd*, had in his tranſlation been applied to ſo eminent a perſonage; and therefore he judiciouſly makes uſe of the trope *ſynecdoche*, and calls him *ſwain* †; a word both elegant and poetical, and not likely to lead the reader into any miſtake about the perſon ſpoken of, as his employment had been deſcribed in a preceding paſſage. The ſame Eumeus is ſaid, in the ſimple but melodious language of the original, to have been making his own ſhoes when Ulyſſes came to his door; a work which in thoſe days the greateſt heroes would often find neceſſary. This too the tranſlator ſoftens by a tropical expreſſion?

Here ſat Eumeus, and his cares applied.
To form ſtrong *buſkins* of well-ſeaſon'd hide.

A hundred other examples might be quoted from this tranſlation; but theſe will explain our meaning.

There are other occaſions, on which the delicacy of figurative language is ſtill more needful: as in Virgil's account of the effects of animal-love, and of the plague among the beaſts, in the third Georgic; where Dryden's ſtyle, by being leſs figurative than the original, is in one place exceedingly filthy, and in another ſhockingly obſcene.

Hobbes could conſtrue a Greek author; but his ſkill in words muſt have been all derived from the dictionary: for he ſeems not to have known, that any one articulate ſound could be more agreeable, or any one phraſe more dignified, than any other. In his Iliad and Odyſſey, even when he hits the author's ſenſe (which is not always the caſe), he proves, by his choice of words, that of harmony, elegance, or energy of ſtyle, he had no manner of conception. And hence that work, though called a *Tranſlation of Homer*, does not even deſerve the name of *poem*; becauſe it is in every reſpect unpleaſing, being nothing more than a fictitious narrative delivered in a mean proſe, with the additional meanneſs of harſh rhyme, and untuneable meaſure.——Trapp underſtood Virgil well enough as a grammarian, and had a taſte for his beauties: yet his tranſlation bears no reſemblance to Virgil; which is owing to the ſame cauſe, an imprudent choice of words and figures, and a total want of harmony.

The delicacy we here contend for, may indeed, both in converſation and in writing, be carried too far. To call *killing an innocent man in a duel* an affair of honour, and *a violation of the rights of wedlock* an affair of gallantry, is a proſtitution of figurative language.

---

† Odyſſ. b. 14. v. 41.

Of Tropes and Figures

Nor is it any credit to us, that we are ſaid to have upwards of 40 figurative phraſes to denote exceſſive drinking. Language of this ſort generally implies, that the public abhorrence of ſuch crimes is not ſo ſtrong as it ought to be; and it is a queſtion, whether even our morals might not be improved, if we were to call theſe and ſuch like crimes by their proper names, *murder, adultery, drunkenneſs, gluttony*; names, that not only expreſs our meaning, but alſo betoken our diſapprobation.——As to writing, it cannot be denied, that even Pope himſelf, in the excellent verſion juſt now quoted, has ſometimes, for the ſake of his numbers, or for fear of giving offence by too cloſe an imitation of Homer's ſimplicity, employed tropes and figures too quaint or too ſolemn for the occaſion. And the finical ſtyle is in part characteriſed by the writer's diſlike to literal expreſſions, and affectedly ſubſtituting in their ſtead unneceſſary tropes and figures. With theſe authors, a man's only child muſt always be his *only hope*; a country-maid becomes a *rural beauty*, or perhaps a *nymph of the groves*; if flattery ſing at all, it muſt be a *ſyren ſong*; the ſhepherd's flute dwindles into an *oaten reed*, and his crook is exalted into a *ſceptre*; the *ſilver lilies* riſe from their *golden beds*, and *languiſh* to the *complaining* gale. A young woman, though a good Chriſtian, cannot make herſelf agreeable without *ſacrificing to the Graces*; nor hope to do any execution among the *gentle ſwains*, till a whole legion of *Cupids*, armed with *flames* and *darts*, and other weapons, begin to diſcharge from her eyes their formidable artillery. For the ſake of variety, or of the verſe, ſome of theſe figures may now and then find a place in a poem; but in proſe, unleſs very ſparingly uſed, they ſavour of affectation.

(3.) Tropes and figures promote brevity; and brevity, united with perſpicuity, is always agreeable. An example or two will be given in the next paragraph. Sentiments thus delivered, and imagery thus painted, are readily apprehended by the mind, make a ſtrong impreſſion upon the fancy, and remain long in the memory; whereas too many words, even when the meaning is good, never fail to bring diſguſt and wearineſs. They argue a debility of mind which hinders the author from ſeeing his thoughts in one diſtinct point of view; and they alſo encourage a ſuſpicion, that there is ſomething faulty or defective in the matter. In the poetic ſtyle, therefore, which is addreſſed to the fancy and paſſions, and intended to make a vivid, a pleaſing, and a permanent impreſſion, brevity, and conſequently tropes and figures are indiſpenſable. And a language will always be the better ſuited to poetical purpoſes, the more it admits of this brevity;—a character which is more conſpicuous in the Greek and Latin than in any modern tongue, and much leſs in the French than in the Italian or Engliſh.

(4.) Tropes and figures contribute to ſtrength or energy of language, not only by their conciſeneſs, but alſo by conveying to the fancy ideas that are eaſily comprehended, and make a ſtrong impreſſion. We are powerfully affected with what we ſee, or feel, or hear. When a ſentiment comes enforced or illuſtrated by figures taken from objects of ſight, or touch, or hearing, one thinks, as it were, that one ſees, or feels, or hears, the thing ſpoken of; and thus, what in itſelf would perhaps be obſcure, or is merely intellectual, may be made to ſeize our attention and intereſt our paſſions almoſt as effectually as if it were an object of outward ſenſe. When Virgil calls the Scipios *thunderbolts of war*, he very ſtrongly expreſſes in one word, and by one image, the rapidity of their victories, the noiſe their atchievements made in the world, and the ruin and conſternation that attended their irreſiſtible career.——When Homer calls Ajax *the bulwark of the Greeks*, he paints with equal brevity his vaſt ſize and ſtrength, the difficulty of prevailing againſt him, and the confidence wherewith his countrymen repoſed on his valour.——When Solomon ſays of the ſtrange woman, or harlot, that "her feet go *down* to death," he lets us know, not only that her path ends in deſtruction, but alſo, that they who accompany her will find it eaſy to go forwards to ruin, and difficult to return to their duty.——Satan's enormous magnitude, and refulgent appearance, his perpendicular aſcent thro' a region of darkneſs, and the inconceivable rapidity of his motion, are all painted out to our fancy by Milton, in one very ſhort ſimitude,

> Sprung upward, like—a pyramid of fire.
>
> *Par. Loſt*, b. 4. v. 1013.

To take in the full meaning of which figure, we muſt imagine ourſelves in chaos, and a vaſt luminous body riſing upward, near the place where we are, ſo ſwiftly as to appear a continued track of light, and leſſening to the view according to the increaſe of diſtance, till it end in a point, and then diſappear; and all this muſt be ſuppoſed to ſtrike our eye at one inſtant.——Equal to this in propriety, tho' not in magnificence, is that allegory of Gray,

> The paths of glory lead but to the grave:

Which preſents to the imagination a wide plain, where ſeveral roads appear, crowded with glittering multitudes, and iſſuing from different quarters, but drawing nearer and nearer as they advance, till they terminate in the dark and narrow houſe, where all their glories enter in ſucceſſion, and diſappear for ever.——When it is ſaid in Scripture, of a good man who died, that he *fell aſleep*, what a number of ideas are at once conveyed to our imagination, by this beautiful and expreſſive figure! As a labourer, at the cloſe of day, goes to ſleep, with the ſatisfaction of having performed his work, and with the agreeable hope of awaking in the morning of a new day, refreſhed and cheerful; ſo a good man, at the end of life, reſigns himſelf calm and contented to the will of his Maker, with the ſweet reflection of having endeavoured to do his duty, and with the tranſporting hope of ſoon awaking in the regions of light, to life and happineſs eternal. The figure alſo ſuggeſts, that to a good man the tranſition from life to death is, even in the ſenſation, no more painful, than when our faculties melt away into the pleaſing inſenſibility of ſleep.——Satan, flying among the ſtars, is ſaid by Milton to "*ſail* between worlds and worlds;" which has an elegance and force far ſuperior to the proper word *fly*. For by this alluſion to a ſhip, we are made to form a lively idea of his great ſize, and to conceive of his motion, that it was equable and majeſtic.——Virgil uſes a happy figure to expreſs the ſize of the great wooden horſe, by means of which the Greeks were conveyed into Troy: "Equum divina

Palladis arte *ædificant*."——Milton is ſtill bolder when he ſays,

Who would not ſing for Lycidas? he knew
Himſelf to ſing, and *build the lofty rhime.*

The phraſe, however, though bold, is emphatical; and gives a noble idea of the durability of poetry, as well as of the art and attention requiſite to form a good poem.——There are hundreds of tropical expreſſions in common uſe, incomparably more energetic than any proper words of equal brevity that could be put in their place. A cheek *burning* with bluſhes, is a trope which at once deſcribes the colour as it appears to the beholder, and the glowing heat as it is felt by the perſon bluſhing. *Chilled* with deſpondence, *petrefied* with aſtoniſhment, *thunderſtruck* with diſagreeable and unexpected intelligence, *melted* with love or pity, *diſſolved* in luxury, *hardened* in wickedneſs, *ſoftening* into remorſe, *inflamed* with deſire, *toſſed* with uncertainty, &c.—every one is ſenſible of the force of theſe and the like phraſes, and that they muſt contribute to the energy of compoſition.

(5.) Tropes and figures promote ſtrength of expreſſion; and are in poetry peculiarly requiſite, becauſe they are often more *natural*, and more *imitative*, than proper words. In fact, this is ſo much the caſe, that it would be impoſſible to imitate the language of paſſion without them. It is true, that when the mind is agitated, one does not run out into allegories, or long-winded ſimilitudes, or any of the figures that require much attention and many words, or that tend to withdraw the fancy from the object of the paſſion. Yet the language of many paſſions muſt be figurative, notwithſtanding; becauſe they rouſe the fancy, and direct it to objects congenial to their own nature, which diverſify the language of the ſpeaker with a multitude of alluſions. The fancy of a very angry man, for example, preſents to his view a train of diſagreeable ideas connected with the paſſion of anger, and tending to encourage it; and if he ſpeak without reſtraint during the paroxyſm of his rage, thoſe ideas will force themſelves upon him, and compel him to give them utterance. "Infernal monſter! (he will ſay),—my blood boils at him; he has uſed me like a dog; never was man ſo injured as I have been by this barbarian. He has no more ſenſe of propriety than a ſtone. His countenance is diabolical, and his ſoul as ugly as his countenance. His heart is cold and hard, and his reſolutions dark and bloody," &c. This ſpeech is wholly figurative. It is made up of *metaphors* and *hyperboles*, which, with the *proſopopeia* and *apoſtrophe*, are the moſt paſſionate of all the figures. Lear, driven out of doors by his unnatural daughters, in the midſt of darkneſs, thunder, and tempeſt, naturally breaks forth (for his indignation is juſt now raiſed to the very higheſt pitch) into the following violent exclamation againſt the crimes of mankind, in which almoſt every word is figurative.

Tremble, thou wretch,
That haſt within thee undivulged crimes
Unwhipt of juſtice. Hide thee, thou bloody hand,
Thou perjur'd, and thou ſimular of virtue,
That art inceſtuous. Caitiff, to pieces ſhake,
That under covert, and convenient ſeeming,
Haſt practis'd on man's life. Cloſe pent-up guilts,
Rive your concealing continents, and cry
Theſe dreadful ſummoners grace. *King Lear.*

——The vehemence of maternal love, and ſorrow from the apprehenſion of loſing her child, make the Lady Conſtance utter a language that is ſtrongly figurative, though quite ſuitable to the condition and character of the ſpeaker. The paſſage is too long for a quotation, but concludes thus:

O Lord! my boy, my Arthur, my fair ſon,
My life, my joy, my food, my all the world,
My widow-comfort, and my ſorrow's cure. *King John.*

——Similar to this, and equally expreſſive of conjugal love, is that beautiful hyperbole in Homer; where Andromache, to diſſuade her huſband from going out to the battle, tells him, that ſhe had now no mother, father, or brethren, all her kindred being dead, and her native country deſolate; and then tenderly adds,

But while my Hector yet ſurvives, I ſee
My father, mother, brethren, all in thee. *Iliad*, b. 6.

As the paſſions that agitate the ſoul, and rouſe the fancy, are apt to vent themſelves in tropes and figures, ſo thoſe that depreſs the mind adopt for the moſt part a plain diction without any ornament. For to a dejected mind, wherein the imagination is generally inactive, it is not probable that any great variety of ideas will preſent themſelves; and when theſe are few and familiar, the words that expreſs them muſt be ſimple. As no author equals Shakeſpeare in boldneſs or variety of figures, when he copies the ſtyle of thoſe violent paſſions that ſtimulate the fancy; ſo, when he would exhibit the human mind in a dejected ſtate, no uninſpired writer excels him in ſimplicity. The ſame Lear whoſe reſentment had impaired his underſtanding, while it broke out in the moſt boiſterous language, when, after ſome medical applications, he recovers his reaſon, his rage being now exhauſted, his pride humbled, and his ſpirits totally depreſſed, ſpeaks in a ſtyle than which nothing can be imagined more ſimple, or more affecting:

Pray, do not mock me;
I am a very fooliſh, fond old man,
Fourſcore and upward, and, to deal plainly with you,
I fear I am not in my perfect mind.
Methinks I ſhould know you, and know this man;
Yet I am doubtful: for I am mainly ignorant
What place this is; and all the ſkill I have
Remembers not theſe garments: nor I know not
Where I did lodge laſt night.— LEAR, *act* 4. *ſc.* 7.

——Deſdemona, ever gentle, artleſs, and ſincere, ſhocked at the unkindneſs of her huſband, and overcome with melancholy, ſpeaks in a ſtyle ſo beautifully ſimple, and ſo perfectly natural, that one knows not what to ſay in commendation of it:

My mother had a maid call'd Barbara;
She was in love, and he ſhe lov'd prov'd mad,
And did forſake her. She had a ſong of willow;
An old thing it was, but it expreſs'd her fortune,
And ſhe died ſinging it. That ſong to-night
Will not go from my mind; I have much to do,
But to go hang my head all at one ſide,

And ſing it like poor Barbara. OTHELLO, *act* 4. *ſc.* 3.

Sometimes the imagination, even when exerted to the utmoſt, takes in but few ideas. This happens when the attention is totally engroſſed by ſome very great object; admiration being one of thoſe emotions that rather ſuſpend the exerciſe of the faculties, than puſh them into action. And here, too, the ſimpleſt language is the moſt natural; as when Milton ſays of the Deity, that he ſits "high-thron'd above all height." And as this ſimplicity is more ſuitable to that one great exertion which occupies the ſpeaker's mind, than a more elaborate imagery or language would have been; ſo has it alſo a more powerful effect in fixing and elevating the imagination of the hearer: for, to introduce other thoughts for the ſake of illuſtrating what cannot be illuſtrated, could anſwer no other purpoſe than to draw off the attention from the principal idea. In theſe and the like caſes, the fancy left to itſelf will have more ſatisfaction in purſuing at leiſure its own ſpeculations, than in attending to thoſe of others; as they who ſee for the firſt time ſome admirable object, would chooſe rather to feaſt upon it in ſilence, than to have their thoughts interrupted by a long deſcription from another perſon, informing them of nothing but what they ſee before them, are already acquainted with, or may eaſily conceive.

It was remarked above, that the *hyperbole*, *proſopopeia*, and *apoſtrophe*, are among the moſt paſſionate figures. This deſerves illuſtration.

1ſt, A very angry man is apt to think the injury he has juſt received, greater than it really is; and, if he proceed immediately to retaliate by word or deed, ſeldom fails to exceed the due bounds, and to become injurious in his turn. The fond parent looks upon his child as a prodigy of genius and beauty; and the romantic lover will not be perſuaded that his miſtreſs has nothing ſupernatural either in her mind or perſon. Fear, in like manner, not only magnifies its object when real, but even forms an object out of nothing, and miſtakes the fictions of fancy for the intimations of ſenſe.—No wonder then, that they who ſpeak according to the impulſe of paſſion, ſhould ſpeak *hyperbolically*; that the angry man ſhould exaggerate the injury he has received, and the vengeance he is going to inflict; that the ſorrowful ſhould magnify what they have loſt, and the joyful what they have obtained; that the lover ſhould ſpeak extravagantly of the beauty of his miſtreſs, the coward of the dangers he has encountered, and the credulous clown of the miracles performed by the juggler. In fact, theſe people would not do juſtice to what they feel, if they did not ſay more than the truth. The valiant man, on the other hand, as naturally adopts the diminiſhing hyperbole when he ſpeaks of danger; and the man of ſenſe, when he is obliged to mention his own virtue or ability; becauſe it appears to him, or he is willing to conſider it, as leſs than the truth, or at beſt as inconſiderable. Contempt uſes the ſame figure; and therefore Petruchio, affecting that paſſion, affects alſo the language of it:

Thou lieſt, thou thread, thou thimble,
Thou yard, three-quarters, half-yard, quarter, nail,
Thou flea, thou nit, thou winter-cricket, thou!
Brav'd in mine own houſe with a ſkein of thread!
Away, thou rag, thou quantity, thou remnant!
Taming of the Shrew, *act* 4. *ſc.* 1.

For ſome paſſions conſider their objects as important, and others as unimportant. Of the former ſort are anger, love, fear, admiration, joy, ſorrow, pride; of the latter are contempt and courage. Thoſe may be ſaid to ſubdue the mind to the object; and theſe, to ſubdue the object to the mind. And the former, when violent, always magnify their objects; whence the hyperbole called amplification, or *auxeſis*: and the latter as conſtantly diminiſh theirs, and give riſe to the hyperbole called *meioſis*, or diminution.—Even when the mind cannot be ſaid to be under the influence of any violent paſſion, we naturally employ the ſame figure, when we would expreſs another very ſtrongly with any idea. He is a walking ſhadow; he is worn to ſkin and bone; he has one foot in the grave, and the other following;—theſe, and the like phraſes, are proved to be natural by their frequency. By introducing great ideas, the hyperbole is further uſeful in poetry, as a ſource of the ſublime; but when employed injudiciouſly, is very apt to become ridiculous. Cowley makes Goliah as big as the hill down which he was marching †; and tells us, that when he came into the valley, he ſeemed to fill it, and to overtop the neighbouring mountains, (which, by the by, ſeems rather to leſſen the mountains and valleys, than to magnify the giant); nay, he adds, that the ſun ſtarted back when he ſaw the ſplendour of his arms. This poet ſeems to have thought, that the figure in queſtion could never be ſufficiently enormous; but Quintilian would have taught him, "Quamvis omnis hyperbole ultra fidem, non tamen eſſe debet ultra modum." The reaſon is, that this figure, when exceſſive, betokens rather abſolute infatuation, than intenſe emotion; and reſembles the efforts of a ranting tragedian, or the ravings of an enthuſiaſtic declaimer, who, by putting on the geſtures and looks of a lunatic, ſatisfy the diſcerning part of their audience, that, inſtead of feeling ſtrongly, they have no rational feelings at all. In the wildeſt energies of nature, there is a modeſty, which the imitative artiſt will be careful never to overſtep.

2dly, That figure, by which things are ſpoken of as if they were perſons, is called *proſopopeia*, or *perſonification*. It is a bold figure, and yet is often natural. Long acquaintance recommends to ſome ſhare in our affection even things inanimate, as a houſe, a tree, a rock, a mountain, a country; and were we to leave ſuch a thing, without hope of return, we ſhould be inclined to addreſs it with a farewell, as if it were a percipient creature. Nay, we find that ignorant nations have actually worſhipped ſuch things, or conſidered them as the haunt of certain powerful beings. Dryads and Hamadryads were by the Greeks and Romans ſuppoſed to preſide over trees and groves; river-gods and nymphs, over ſtreams and fountains; little deities, called *Lares* and *Penates*, were believed to be the guardians of hearths and houſes. In Scotland there is hardly a hill remarkable for the beauty of its ſhape, that was not in former times thought to be the habitation of fairies. Nay, modern as well as ancient ſuperſtition has appropriated the waters to a peculiar ſort of demon or goblin, and peopled the very regions of death, the tombs and charnel-houſes, with multitudes of ghoſts and phantoms.—Beſides, when things inanimate make a ſtrong impreſſion upon us, whether agreeable or otherwiſe, we are apt to addreſs them in terms of affection or diſlike. The ſailor bleſſes the plank that brought him aſhore from the ſhipwreck; and the paſſionate man, and ſometimes even the philoſopher, will ſay bitter words to the ſtumbling-block that gave him a fall.—Moreover, a man agitated with any intereſting paſſion, eſpecially of long continuance, is apt to fancy that all nature ſympathiſes with him. If he has loſt a beloved friend, he thinks the ſun leſs bright than at other times; and in the ſighing of the winds and groves, in the lowings of the herd, and in the murmurs of the ſtream, he ſeems to hear the voice of lamentation. But when joy or hope predominate, the whole world aſſumes a gay appearance. In the contemplation of every part of nature, of every condition of mankind, of every form of human ſociety, the benevolent and the pious man, the moroſe and the cheerful, the miſer and the miſanthrope, finds occaſion to indulge his favourite paſſion, and ſees, or thinks he ſees, his own temper reflected back in the actions, ſympathies, and tendencies of other things and perſons. Our affections are indeed the medium through which we may be ſaid to ſurvey ourſelves, and every thing elſe; and whatever be our inward frame, we are apt to perceive a wonderful congeniality in the world without us. And hence, the fancy, when rouſed by real emotions, or by the pathos of compoſition, is eaſily reconciled to thoſe figures of ſpeech that aſcribe ſympathy, perception, and the other attributes of animal life, to things inanimate, or even to notions merely intellectual.—Motion, too, bears a cloſe affinity to action, and affects our imagination nearly in the ſame manner; and we ſee a great part of nature in motion, and by their ſenſible effects are led to contemplate energies innumerable. Theſe conduct the rational mind to the Great Firſt Cauſe; and theſe, in times of ignorance, diſpoſed the vulgar to believe in a variety of ſubordinate agents employed in producing thoſe appearances that could not otherwiſe be accounted for. Hence an endleſs train of fabulous deities, and of witches, demons, fairies, genii; which, if they prove our reaſon weak and our fancy ſtrong, prove alſo, that perſonification is natural to the human mind; and that a right uſe of this figure may have a powerful effect, in fabulous writing eſpecially, to engage our ſympathy in behalf of things as well as perſons: for nothing can give laſting delight to a moral being, but that which awakens ſympathy, and touches the heart; and though it be true, that we ſympathiſe in ſome degree even with inanimate things, yet what has, or is ſuppoſed to have, life, calls forth a more ſincere and more permanent fellow-feeling.—Let it be obſerved further, that to awaken our ſympathetic feelings, a lively conception of their object is neceſſary. This indeed is true of almoſt all our emotions; their keenneſs is in proportion to the vivacity of the perceptions that excite them. Diſtreſs that we ſee, is more affecting than what we only hear of *; a peruſal of the gayeſt ſcenes in a comedy does not rouſe the mind ſo effectually, as the preſence of a cheerful companion; and the death of a friend is of greater energy in producing ſeriouſneſs, and the conſideration of our latter end, than all the pathos of Young. Of deſcriptions addreſſed to the fancy, thoſe that are moſt vivid and pictureſque will generally be found to have the moſt powerful influence over our affections; and thoſe that exhibit perſons engaged in action, and adorned with viſible inſignia, give a briſker impulſe to the faculties, that ſuch as convey intellectual ideas only, or images taken from ſtill life. No abſtract notion of time, or of love, can be ſo ſtriking to the fancy, as the image of an old man accoutred with a ſcythe, or of a beautiful boy with wings and a bow and arrows: and no phyſiological account of frenzy could ſuggeſt ſo vivid an idea, as the poet has given us in that exquiſite portrait,

---

† *Davideis*. b. 3.

> And moody madneſs laughing wild, amid ſevereſt wo.

And for this reaſon partly it is, that the epic poet, in order to work the more effectually upon our paſſions and imagination, refers the ſecret ſprings of human conduct, and the viciſſitudes of human affairs, to the agency of perſonified cauſes; that is, to the machinery of gods and goddeſſes, angels, demons, magicians, and other powerful beings. And hence, in all ſublime poetry, life and motion, with their ſeveral modes and attributes, are liberally beſtowed on thoſe objects wherewith the author intends that we ſhould be ſtrongly impreſſed: ſcenes perfectly inanimate, and ſtill, tending rather to diffuſe a languor over the mind, than to communicate to our internal powers thoſe lively energies, without which a being eſſentially active can never receive complete gratification.—Laſtly, ſome violent paſſions are peculiarly inclined to change things into perſons. The horrors of his mind haunted Oreſtes in the ſhape of furies. Conſcience, in the form of the murdered perſon, ſtares the murderer in the face, and often terrifies him to diſtraction. The ſuperſtitious man, travelling alone in the dark, miſtakes a white ſtone for a ghoſt, a buſh for a demon, a tree waving with the wind for an enormous giant brandiſhing a hundred arms. The lunatic and enthuſiaſt converſe with perſons who exiſt only in their own diſtempered fancy: and the glutton, and the miſer, if they were to give utterance to all their thoughts, would often, it is preſumable, ſpeak, the one of his gold, the other of his belly, not only as a perſon, but as a god,—the object of his warmeſt love and moſt devout regard.—More need not be ſaid to prove, that perſonification is natural, and may frequently contribute to the pathos, energy, and beauty of poetic language.

3*dly*, *Apoſtrophe*, or a ſudden diverſion of ſpeech from one perſon to another perſon or thing, is a figure nearly related to the former. Poets ſometimes make uſe of it, in order to help out their verſe, or merely to give variety to their ſtyle: but on thoſe occaſions it is to be conſidered as rather a trick of art, than an effort of nature. It is moſt natural, and moſt pathetic, when the perſon or thing to whom the apoſtrophe is made, and for whoſe ſake we give a new direction to our ſpeech, is in our eyes eminently diſtinguiſhed for good or evil, or raiſes within us ſome ſudden and powerful emotion, ſuch as the hearer would acquieſce in, or at leaſt acknowledge to be reaſonable. But this, like the other pathetic figures, muſt be uſed with great prudence. For if, inſtead of calling forth the hearer's ſympathy, it ſhould only betray the levity of the ſpeaker, or ſuch wanderings of his mind as neither the ſubject nor the occaſion would lead one to expect, it will then create diſguſt, inſtead of approbation.—The orator, therefore, muſt not attempt the paſſionate apoſtrophe, till the minds of the hearers be prepared to join in it. And every audience is not equally obſequious in this reſpect. In the forum of ancient Rome that would have paſſed for ſublime and pathetic, which in the moſt reſpectable Britiſh auditories would appear ridiculous. For our ſtyle of public ſpeaking is cool and argumentative; and partakes leſs of enthuſiaſm than the Roman did, and much leſs than the modern French or Italian. Of Britiſh eloquence, particularly that of the pulpit, the chief recommendations are gravity and ſimplicity. And it is vain to ſay, that our oratory *ought* to be more vehement: for that matter depends on cauſes, which it is not only inexpedient, but impoſſible to alter; namely, on the character and ſpirit of the people, and their rational notions in regard to religion, policy, and literature. The exclamations of Cicero would weigh but little in our parliament; and many of thoſe which we meet with in French ſermons would not be more effectual if attempted in our pulpit. To ſee one of our preachers, who the moment before was a cool reaſoner, a temperate ſpeaker, an humble Chriſtian, and an orthodox divine, break out into a ſudden apoſtrophe to the immortal powers, or to the walls of the church, tends to force a ſmile, rather than a tear, from thoſe among us who reflect, that there is nothing in the ſubject, and ſhould be nothing in the orator, to warrant ſuch wanderings of fancy, or vehemence of emotion. If he be careful to cultivate a pure ſtyle, and a grave and graceful utterance, a Britiſh clergyman, who ſpeaks from conviction the plain unaffected words of truth and ſoberneſs, of benevolence and piety, will, it is believed, convey more pathetic, as well as more permanent, impreſſions to the heart, and be more uſeful as a Chriſtian teacher, than if he were to put in practice all the attitudes of Roſcius, and all the topes and figures of Cicero.

---

* *Hor. Ar. Poet.* v. 180.

But where the language of paſſion and enthuſiaſm is permitted to diſplay itſelf, whatever raiſes any ſtrong emotion, whether it be animated or inanimate, abſent or preſent, ſenſible or intellectual, may give riſe to the apoſtrophe. A man in a diſtant country, ſpeaking of the place of his birth, might naturally exclaim, "O my dear native land, ſhall I never ſee thee more!" Or, when ſome great misfortune befals him, "Happy are ye, O my parents, that ye are not alive to ſee this." --We have a beautiful apoſtrophe in the third book of the Eneid, where Eneas, who is telling his ſtory to Dido, happening to mention the death of his father, makes a ſudden addreſs to him as follows:

> ————hic, pelagi tot tempeſtatibus actus,
> Heu, genitorem, omnis curæ caſuſque levamen,
> Amitto Anchiſen:—hic me, pater optime, feſſum
> Deſeris, heu, tantis nequicquam erepte periclis!

This apoſtrophe has a pleaſing effect. It ſeems to intimate, that the love which the hero bore his father was ſo great, that when he mentioned him, he forgot every thing elſe; and, without minding his company, one of whom was a queen, ſuddenly addreſſed himſelf to that which, though preſent only in idea, was ſtill a principal object of his affection. An emotion ſo warm and ſo reaſonable cannot fail to command the ſympathy of the reader.——When Michael, in the eleventh book of Paradiſe Loſt, announces to Adam and Eve the neceſſity of their immediate departure from the garden of Eden, the poet's art in preſerving the decorum of the two characters is very remarkable. Pierced to the heart at the thought of leaving that happy place, Eve, in all the violence of ungovernable ſorrow, breaks forth into a pathetic apoſtrophe to Paradiſe, to the flowers ſhe had reared, and to the nuptial bower ſhe had adorned. Adam makes no addreſs to the walks, the trees, or the flowers of the garden, the loſs whereof did not ſo much afflict him; but, in his reply to the Archangel, expreſſes, without a figure, his regret for being baniſhed from a place where he had been ſo oft honoured with a ſenſible manifeſtation of the Divine preſence. The uſe of the apoſtrophe in the one caſe, and the omiſſion of it in the other, not only gives a beautiful variety to the ſtyle, but alſo marks that ſuperior elevation and compoſure of mind, by which the poet had all along diſtinguiſhed the character of Adam.—One of the fineſt applications of this figure that is any where to be ſeen, is in the fourth book of the ſame poem; where the author, catching by ſympathy the devotion of our firſt parents, ſuddenly drops his narrative, and joins his voice to theirs in adoring the Father of the univerſe.

> Thus at their ſhady lodge arriv'd, both ſtood,
> Both turn'd, and under open ſky ador'd
> The God that made both ſky, air, earth, and heav'n,
> Which they beheld, the moon's reſplendent globe,
> And ſtarry pole:—Thou alſo mad'ſt the night,
> Maker Omnipotent! and thou the day,
> Which we in our appointed work employ'd
> Have finiſh'd.————

Milton took the hint of this fine contrivance from a well-known paſſage of Virgil:

> Hic juvenum chorus, ille ſenum; qui carmine laudes
> Herculeas et facta ferant;————
> ————ut duros mille labores
> Rege ſub Euryſtheo, fatis Junonis iniquæ
> Pertulerit:—Tu nubigenas, invicte, bimembres
> Hylæum Pholoumque manu; tu Creſia mactas
> Prodigia.————

The beauty ariſing from diverſified compoſition is the ſame in both, and very great in each. But every reader muſt *feel*, that the figure is incomparably more affecting to the mind in the imitation, than in the original. So true it is, that the moſt rational emotions raiſe the moſt intenſe fellow-feeling; and that the apoſtrophe is then the moſt emphatical, when it diſplays thoſe workings of human affection which are at once ardent and well-founded.

To conclude this head: Tropes and figures, particularly the *metaphor*, *ſimilitude*, and *allegory*, are further uſeful in beautifying language, by ſuggeſting, together with the thoughts eſſential to the ſubject, an endleſs variety of agreeable images, for which there would be no place, if writers were always to confine themſelves to the *proper* names of things. And this beauty and variety, judiciouſly applied, is ſo far from diſtracting, that it tends rather to fix, the attention, and captivate the heart of the readers, by giving light, and life, and pathos to the whole compoſition.

II. That tropes and figures are more neceſſary to poetry, than to any other mode of writing, was the ſecond point propoſed to be illuſtrated in this ſection.

Language, as already obſerved, is then natural, when it is ſuitable to the ſuppoſed condition of the ſpeaker. Figurative language is peculiarly ſuitable to the ſuppoſed condition of the poet; becauſe figures are ſuggeſted by the fancy; and the fancy of him who compoſes poetry is more employed, than that of any other author. Of all hiſtorical, philoſophical, and theological reſearches, the object is *real* truth, which is fixed and permanent. The aim of rhetorical declamation (according to Cicero) is *apparent* truth; which, being leſs determinate, leaves the fancy of the ſpeaker more free, gives greater ſcope to the inventive powers, and ſupplies the materials of a more figurative phraſeology. But the poet is ſubject to no reſtraints, but thoſe of veriſimilitude; which is ſtill leſs determinate than rhetorical truth. He ſeeks not to convince the judgment of his reader by arguments of either real or apparent cogency; he means only to pleaſe and intereſt him, by an appeal to his ſenſibility and imagination. His own imagination is therefore continually at work, ranging through the whole of real and probable exiſtence, “glancing from heaven to earth, from earth to heaven,” in queſt of images and ideas ſuited to the emotions he himſelf feels, and to the ſympathies he would communicate to others. And, conſequently, figures of ſpeech, the offſpring of excurſive fancy, muſt (if he ſpeak according to what he is ſuppoſed to think and feel, that is, according to his ſuppoſed condition) tincture the language of the poet more than that of any other compoſer. So that, if figurative diction be unnatural in geometry, becauſe all wanderings of fancy are unſuitable, and even impoſſible, to the geometrician, while intent upon his argument; it is, upon the ſame principle, perfectly natural, and even unavoidable, in poetry; becauſe the more a poet attends to his ſubject, and the better qualified he is to do it juſtice, the more active will his imagination be, and the more diverſified the ideas that preſent themſelves to his mind.——Beſides, the true poet addreſſes himſelf to the paſſions and ſympathies of mankind; which, till his own be raiſed, he cannot hope to do with ſucceſs. And it is the nature of many paſſions, though not of all, to increaſe the activity of imagination: and an active imagination naturally vents itſelf in figurative language; nay, unleſs reſtrained by a correct taſte, has a tendency to exceed in it;—of which biſhop Taylor, and lord Verulam, two geniuſes different in kind, but of the higheſt order, are memorable examples.

We ſaid, that “the poet ſeeks not to convince the judgment of his reader by arguments of either real or apparent cogency.”——We do not mean, that in poetry argument has no place. The moſt legitimate reaſoning, the ſoundeſt philoſophy, and narratives purely hiſtorical, may appear in a poem, and contribute greatly to the honour of the author, and to the importance of his work. All this we have in Paradiſe Loſt.——We mean, that what diſtinguiſhes *pure* poetry from other writing, is its aptitude, not to ſway the judgment by reaſoning, but to pleaſe the fancy, and move the paſſions, by a lively imitation of nature. Nor would we exclude poetical embelliſhment from hiſtory, or even from philoſophy. Plato's Dialogues and Addiſon's Moral Eſſays abound in poetic imagery; and Livy and Tacitus often amuſe their readers with poetical deſcription. In like manner, though geometry and phyſics be different ſciences;—though abſtract ideas be the ſubject, and pure demonſtration or intuition the evidence, of the former; and though the material univerſe, and the informations of ſenſe, be the ſubject and the evidence of the latter;—yet have theſe ſciences been united by the beſt philoſophers, and very happy effects reſulted from the union.——In one and the ſame work, poetry, hiſtory, philoſophy, and oratory, may doubtleſs be blended; nay, theſe arts have all been actually blended in one and the ſame work, not by Milton only, but alſo by Homer, Virgil, Lucan, and Shakeſpeare. Yet ſtill theſe arts are different;—different in their ends and principles, and in the faculties of the mind to which they are reſpectively addreſſed: and it is eaſy to perceive, when a writer employs one, and when another.

§ 2. *Of the* SOUND *of Poetical Language.*

20. As the ear, like every other perceptive faculty, is capable of gratification, regard is to be had to the ſound of words, even in proſe. But to the harmony of language, it behoves the poet, more than any other writer, to attend; as it is more eſpecially his concern to render his work pleaſurable. In fact, we find, that no poet was ever popular who did not poſſeſs the art of harmonious compoſition.

What belongs to the ſubject of Poetical Harmony may be referred to one or other of theſe heads: Sweetneſs, Meaſure, and Imitation.

I. In order to give *ſweetneſs* to language, either in verſe or proſe, all words of harſh ſound, difficult pronounciation, or unwieldy magnitude, are to be avoided as much as poſſible, unleſs when they have in the ſound ſomething peculiarly emphatical; and words are to be ſo placed in reſpect of one another, as that diſcordant combinations may not reſult from their union. But in poetry this is more neceſſary than in proſe; poetical language being underſtood to be an imitation of natural language improved to that perfection which is conſiſtent with probability. To poetry, therefore, a greater latitude muſt be allowed than to proſe, in expreſſing, by tropes and figures of pleaſing ſound, thoſe ideas whereof the proper names are in any reſpect offenſive, either to the ear or to the fancy.

II. How far verſification, or *regular meaſure*, may be eſſential to this art, has been diſputed by critical writers; ſome holding it to be indiſpenſably neceſſary, and ſome not neceſſary at all.

The fact ſeems to be, as already hinted, that to poetry verſe is not eſſential. In a proſe work, we may have the fable, the arrangement, and a great deal of the pathos and language, of poetry; and ſuch a work is certainly a poem, though perhaps not a perfect one. For how abſurd would it be to ſay, that by changing the poſition only of a word or two in each line, one might diveſt Homer's Iliad of the poetical character! At this rate, the arts of poetry and verſification would be the ſame; and the rules in Deſpauter's Grammar, and the moral diſtichs aſcribed to Cato, whould be as real poetry as any part of Virgil. In fact, ſome very ancient poems, when tranſlated into a modern tongue, are far leſs poetical in verſe than in proſe; the alterations neceſſary to adapt them to our numbers being detrimental to their ſublime ſimplicity; of which any perſon of taſte will be ſenſible, who compares our common proſe-verſion of Job, the Pſalms, and the Song of Solomon, with the beſt metrical paraphraſe of thoſe books that has yet appeared. Nay, in many caſes, Comedy will be more poetical, becauſe more pleaſing and natural, in proſe, than in verſe. By verſifying Tom Jones and The Merry Wives of Windſor, we ſhould ſpoil the two fineſt Comic poems, the one Epic, the other Dramatical, now in the world.

But, ſecondly, Though verſe be not eſſential to poetry, it is neceſſary to the perfection of all poetry that admits of it. Verſe is to poetry, what colours are to painting (K). A painter might diſplay great genius, and draw maſterly figures with chalk or ink; but if he intend a perfect picture, he muſt employ in his work as many colours as are ſeen in the object he imitates. Or, to adopt a beautiful compariſon of Demoſthenes, quoted by Ariſtotle †, "Verſification is to poetry what bloom is to the human countenance." A good face is agreeable when the bloom is gone, and good poetry may pleaſe without verſification; harmonious numbers may ſet off an indifferent poem, and a fine bloom indifferent features: but, without verſe, poetry is complete; and beauty is not perfect, unleſs to ſweetneſs and regularity of feature there be ſuperadded

The bloom of young deſire, and purple light of love.

If numbers are neceſſary to the perfection of the higher poetry, they are no leſs ſo to that of the lower kinds, to Paſtoral, Song, and Satire, which have little beſides the language and verſification to diſtinguiſh them from proſe; and which ſome ancient authors are unwilling to admit to the rank of poems:—though it ſeems too nice a ſcruple, both becauſe ſuch writings are commonly termed *poetical;* and alſo becauſe there is, even in them, ſomething that may not improperly be conſidered as an imitation of nature.

That the rhythm and meaſures of verſe are naturally agreeable, and therefore that by theſe poetry may be made more pleaſing than it would be without them, is evident from this, that children and illiterate people, whoſe admiration we cannot ſuppoſe to be the effect of habit or prejudice, are exceedingly delighted with them. In many proverbial ſayings, where there is neither rhime nor alliteration, rhythm is obviouſly ſtudied. Nay, the uſe of rhythm in poetry is univerſal; whereas alliteration and rhime, though reliſhed by ſome nations, are not much ſought after by others. And we need not be at a loſs to account for the agreeableneſs of proportion and order, if we reflect, that they ſuggeſt the agreeable ideas of contrivance and ſkill, at the ſame time that they render the connection of things obvious to the underſtanding, and imprint it deeply on the memory. Verſe, by promoting diſtinct and eaſy remembrance, conveys ideas to the mind with energy, and enlivens every emotion the poet intends to raiſe in the reader or hearer. Beſides, when we attend to verſes, after hearing one or two, we become acquainted with the meaſure, which therefore we always look for in the ſequel. This perpetual interchange of hope and gratification is a ſource of delight; and to this in part is owing the pleaſure we take in the rhimes of modern poetry. And hence we ſee, that though an incorrect rhime, or untuneable verſe, be in itſelf, and compared with an important ſentiment, a very trifling matter; yet it is no trifle in regard to its effects on the hearer; becauſe it brings diſappointment, and ſo gives a temporary ſhock to the mind, and interrupts the current of the affections; and becauſe it ſuggeſts the diſagreeable ideas of negligence or want of ſkill on the part of the author. And therefore, as the public ear becomes more delicate, the negligence will be more glaring, and the diſappointment more intenſely felt; and correctneſs of rhime and of meaſure will of courſe be the more indiſpenſable. In our tongue, rhime is more neceſſary to Lyric than to Heroic poetry. The reaſon ſeems to be, that in the latter the ear can of itſelf perceive the boundary of the meaſure, becauſe the lines are all of equal length nearly, and every good reader makes a ſhort pauſe at the end of each; whereas, in the former, the lines vary in length: and therefore the rhime is requiſite to make the meaſure and rhythm ſufficiently perceptible. Cuſtom too may have ſome influence. Engliſh Odes without rhime are uncommon; and therefore have ſomething awkward about them, or ſomething at leaſt to which the public ear is not yet thoroughly reconciled.

Moreover, in poetry, as in muſic, rhythm is the ſource of much pleaſing variety; of variety tempered with uniformity, and regulated by art: inſomuch, that, notwithſtanding the likeneſs of one hexameter verſe to another, it is not common, either in Virgil or in Homer, to meet with two contiguous hexameters whoſe rhythm is exactly the ſame. And though all Engliſh heroic verſes conſiſt of five feet, among which the iambic predominates; yet this meaſure, in reſpect of rhythm alone, is ſuſceptible of more than 30 varieties. And let it be remarked further, that different kinds of verſe, by being adapted to different ſubjects and modes of writing, give variety to the poetic language, and multiply the charms of this pleaſing art.

What has formerly been ſhown to be true in regard to ſtyle, will alſo in many caſes hold true of verſification, "that it is then *natural,* when it is adapted to the *ſuppoſed condition* of the ſpeaker."—In the epopee, the poet aſſumes the character of calm inſpiration; and therefore his language muſt be elevated, and his numbers majeſtic and uniform. A peaſant ſpeaking in heroic or hexameter verſe is no improbability here; becauſe his words are ſuppoſed to be tranſmitted by one who will of his own accord give them every ornament neceſſary to reduce them into dignified meaſure; as an eloquent man, in a ſolemn aſſembly, recapitulating the ſpeech of a clown, would naturally expreſs it in pure and perſpicuous language. The uniform heroic meaſure will ſuit any ſubject of dignity, whether narrative or didactic, that admits or requires uniformity of ſtyle. In tragedy, where the imitation of real life is more perfect than in epic poetry, the uniform magnificence of epic numbers might be improper; becauſe the heroes and heroines are ſuppoſed to ſpeak in their

---

† Rhetor. lib. 3. cap. 4.

(K) Horace ſeems to hint at the ſame compariſon, when, after ſpecifying the ſeveral ſorts of verſe ſuitable to Epic, Elegiac, Lyric, and Dramatic Poetry, he adds,

Deſcriptas ſervare vices, *operumque colores.*
Cur ego, ſi nequeo ignoroque, Poeta ſalutor? *Ar. Poet verſ.* 86.

own perſons, and according to the immediate impulſe of paſſion and ſentiment. Yet, even in tragedy, the verſification may be both harmonious and dignified; becauſe the characters are taken chiefly from high life, and the events frnm a remote period; and becauſe the higher poetry is permitted to imitate nature, not as it is, but in that ſtate of perfection in which it might be. The Greeks and Romans conſidered their hexameter as too artificial for dramatic poetry; and therefore in tragedy, and even in comedy, made uſe of the iambic, and ſome other meaſures that came near the cadence of converſation: we uſe the iambic both in the epic and dramatic poem; but for the moſt part it is, or ought to be, much more elaborate in the former than in the latter. In dramatic comedy, where the manners and concerns of familiar life are exhibited, verſe would ſeem to be unnatural, except it be ſo like the ſound of common diſcourſe, as to be hardly diſtinguiſhable from it. Cuſtom, however, may in ſome countries determine otherwiſe; and againſt cuſtom, in theſe matters, it is vain to argue. The profeſſed enthuſiaſm of the dithyrambic poet renders wildneſs, variety, and a ſonorous harmony of numbers, peculiarly ſuitable to his odes. The love-ſonnet, and Anacreontic ſong, will be leſs various, more regular, and of a ſofter harmony; becauſe the ſtate of mind expreſſed in it has more compoſure. Philoſophy can ſcarce go further in this inveſtigation, without deviating into whim and hypotheſis. The particular ſorts of verſe to be adopted in the lower ſpecies of poetry, are determined by faſhion chiefly, and the practice of approved authors.

III. The origin and principles of *imitative harmony*, or of that artifice by which the ſound is made, as Pope ſays, "an echo to the ſenſe," may be explained in the following manner.

It is pleaſing to obſerve the uniformity of nature in all her operations. Between moral and material beauty and harmony, between moral and material deformity and diſſonance, there obtains a very ſtriking analogy. The viſible and audible expreſſions of almoſt every virtuous emotion are agreeable to the eye and the ear, and thoſe of almoſt every criminal paſſion diſagreeable. The looks, the attitudes, and the vocal ſounds, natural to benevolence, to gratitude, to compaſſion, to piety, are in themſelves graceful and pleaſing; while anger, diſcontent, deſpair, and cruelty, bring diſcord to the voice, deformity to the features, and diſtortion to the limbs. That flowing curve, which painters know to be eſſential to the beauty of animal ſhape, gives place to a multiplicity of right lines and ſharp angles in the countenance and geſture of him who knits his brows, ſtretches his noſtrils, grinds his teeth, and clenches his fiſt; whereas devotion, magnanimity, benevolence, contentment, and good-humour, ſoften the attitude, and give a more graceful ſwell to the outline of every feature. Certain vocal tones accompany certain mental emotions. The voice of ſorrow is feeble and broken, that of deſpair boiſterous and incoherent; joy aſſumes a ſweet and ſprightly note, fear a weak and tremulous cadence; the tones of love and benevolence are muſical and uniform, thoſe of rage loud and diſſonant; the voice of the ſedate reaſoner is equable and grave, but not unpleaſant; and he who declaims with energy, employs many varieties of modulation ſuited to the various emotions that predominate in his diſcourſe.

But it is not in the language of paſſion only, that the human voice varies its tone, or the human face its features. Every ſtriking ſentiment, and every intereſting idea, has an effect upon it. One would eſteem that perſon no adept in narrative eloquence, who ſhould deſcribe with the very ſame accent, ſwift and ſlow motion, extreme labour and eaſy performance, agreeable ſenſation and excruciating pain; who ſhould talk of the tumult of a tempeſtuous ocean, the roar of thunder, the devaſtations of an earthquake, or an Egyptian pyramid tumbling into ruins, in the ſame tone of voice wherewith he deſcribes the murmur of a rill, the warbling of the harp of Eolus, the ſwinging of a cradle, or the deſcent of an angel. Elevation of mind gives dignity to the voice. From Achilles, Sarpedon, and Othello, we ſhould as naturally expect a manly and ſonorous accent, as a nervous ſtyle and majeſtic attitude. Coxcombs and bullies, while they aſſume airs of importance and valour, affect alſo a dignified articulation.

Since the tones of natural language are ſo various, poetry, which imitates the language of nature, muſt alſo vary its tones; and, in reſpect of ſound as well as of meaning, be framed after that model of ideal perfection, which the variety and energy of the human articulate voice render probable. This is the more eaſily accompliſhed, becauſe, in every language, there is between the ſound and ſenſe of certain words a perceptible analogy; which, though not ſo accurate as to lead a foreigner from the ſound to the ſignification, is yet accurate enough to ſhow, that, in forming ſuch words, regard has been had to the imitative qualities of vocal ſound. Such, in Engliſh, are the words yell, craſh, crack, hiſs, roar, murmur, and many others.

All the particular laws that regulate this ſort of imitation, as far as they are founded in nature, and liable to the cognizance of philoſophy, depend on the general law of ſtyle above-mentioned. Together with the other circumſtances of the ſuppoſed ſpeaker, the poet takes into conſideration the tone of voice ſuitable to the ideas that occupy his mind, and thereto adapts the ſound of his language, if it can be done conſiſtently with eaſe and elegance of expreſſion. But when this imitative harmony is too much ſought after, or words appear to be choſen for ſound rather than ſenſe, the verſe becomes finical and ridiculous. Such is Ronſard's affected imitation of the ſong of the ſky-lark:

> Elle quindée du zephire
> Sublime en l'air vire et revire,
> Et y declique un joli cris,
> Qui rit, guérit, et tire l'ire
> Des eſprit mieux que je n' écris.

This is as ridiculous as that line of Ennius,

> Tum tuba terribili ſonitu taratantara dixit:

Or as the following verſes of Swift;

> The man with the kettle-drum enters the gate,
> Dub dub a dub dub: the trumpeters follow,
> Tantara tantara; while all the boys hollow.

Words by their ſound may imitate ſound; and quick or ſlow articulation may imitate quick or ſlow motion. Hence, by a proper choice and atrangement of words, the

Of Poetical Harmony.

the poet may imitate, *Sounds* that are ſweet with dignity (F), — ſweet and tender (G), — loud (H), — and harſh (I); — and *Motions* that are, ſlow in conſequence of dignity (K), — ſlow in conſequence of difficulty (L), ſwift and noiſy (M), — ſwift and ſmooth (N), — uneven and abrupt (O), — quick and joyous (P). An unexpected pauſe in the verſe may alſo imitate a ſudden failure of ſtrength (Q), or interruption of motion (R), or give vivacity to an image or thought, by fixing our attention longer than uſual upon the word that precedes it (S). — Moreover, when we deſcribe great bulk, it is natural for us to articulate ſlowly even in common diſcourſe; and therefore a line of poetry that requires a ſlow pronunciation, or ſeems longer than it ſhould be, may be uſed with good effect in deſcribing vaſtneſs of ſize (T). — Sweet and ſmooth numbers are moſt proper, when the poet paints agreeable objects, or gentle energy (U); and harſher ſounds when he ſpeaks of

---

(F) No ſooner had th' Almighty ceas'd, than all
The multitude of angels, with a ſhout
Loud as from numbers without number, ſweet
As from bleſt voices uttering joy; heav'n rung
With jubilee, and loud hoſannas fill'd
The eternal regions.— *Par. Loſt, b.* 3.

See alſo the night-ſtorm of thunder, lightning, wind, and rain, in Virg. Georg. lib. 1. verſ. 328.—334.

(G) Et longum, formoſe, vale, vale, inquit, Iola.
Virg. Ecl. 1.

Formoſam reſonare doces Amarillida ſilvas.
Virg. Ecl. 1.

See alſo the ſimile of the nightingale, Geor. lib. 4. verſ. 511. And ſee that wonderful couplet deſcribing the wailings of the owl, Æneid. IV. 462.

(H) ——— vibratus ab æthere fulgor
Cum ſonitu venit, et ruere omnia viſa repente,
Tyrrhenuſque tubæ mugire per æthera clangor;
Suſpiciunt: iterum atque iterum fragor intonat ingens.
Æneid. 8.

See alſo the ſtorm in the firſt book of the Æneid, and in the fifth of the Odyſſey.

(I) The hoarſe rough verſe ſhall like the torrent roar.
Pope.

——— On a ſudden open fly,
With impetuous recoil and jarring ſound,
Th' infernal doors, and on their hinges grate
Harſh thunder.—— *Par. Loſt,* II. 879.

See alſo Homer's Iliad, lib. 2. ver. 363. and Clarke's annotation.

(K) See an exquiſite example in Gray's Progreſs of Poeſy; the concluſion of the third ſtanza.

(L) And when up ten ſteep ſlopes you've dragg'd your thighs, *Pope.*

Juſt brought out this, when ſcarce his tongue could ſtir. *Pope.*

——— The huge leviathan
Wallowing unwieldy, enormous in their gait,
Tempeſt the ocean. *Par. Loſt,* VII. 411.

See the famous deſcription of Siſyphus rolling the ſtone, Odyſſ. lib. 11. verſ. 592. See Quintil. Inſt. Orat. lib. 9. cap. 4. § 4. compared with Paradiſe Loſt, book 2. verſ. 1022.

(M) Quadrupedante putrem ſonitu quatit ungula campum.
Æneid.

Αυταρ επειτα πεδονδε κυλινδετο λαας αναιδης. *Odyſſ.* 11.

See alſo Virg. Æneid. lib. 1. verſ. 83.—87.

(N) See wild as the winds o'er the deſart he flies.
Pope.

Ille volat, ſimul arva fuga, ſimul æquora verrens.
Virg.

Ρηιδιη τ' επειτα πελει, χαλεπη περ εουσα, *Heſiod.*

(O) Πολλα δ' αναντα καταντα παραντα τε δοχμια τ' ηλθον.
Hom.

The laſs ſhriek'd, ſtarted up, and ſhriek'd again.
Anonym.

(P) Let the merry bells ring round,
And the jocund rebecks ſound,
To many a youth, and many a maid,
Dancing in the chequer'd ſhade. *Milton's Allegro.*

See alſo Gray's Progreſs of Poeſy, ſtanza 3.

(Q) Ac velut in ſomnis oculos ubi languida preſſit
Nocte quies, nequicquam avidos extendere curſus
Velle videmur: — et in mediis conatibus ægri
Succidimus.—— *Æneid.*

See alſo Virg. Georg. lib. 3. verſ. 515. 516.

(R) For this, be ſure to-night thou ſhalt have cramps,
Side-ſtitches that ſhall pen thy breath up. Urchins
Shall exerciſe upon thee.——
Proſpero to Calyban in *the Tempeſt.*

See Pope's Iliad, XIII. 199.

(S) ——— How often from the ſteep
Of echoing hill or thicket have we heard
Celeſtial voices, to the midnight air,
Sole, — or reſponſive to each other's note,
Singing their great Creator?—— *Par. Loſt, b.* 4.

And over them triumphant Death his dart
Shook,—— but delay'd to ſtrike. *Id.*

See alſo Hom. Odyſſ. l. 9. v. 290.

(T) Thus ſtretch'd out, huge in length, the arch fiend lay.
Par. Loſt.

Monſtrum horrendum, informe, ingens, cui lumen ademptum. *Æneid.* 3.

Et magnos membrorum artus, magna oſſa, lacertoſque
Exuit, atque ingens media conſiſtit arena.
Æneid. v. 422.

(U) Hic gelidi fontes, hic mollia prata, Lycori,
Hic nemus, hic ipſo tecum conſumerer ævo.
Virg. Ecl. 10.

The dumb ſhall ſing; the lame his crutch forego,
And leap, exulting, like the bounding roe.
Pope's Meſſiah.

See Milton's deſcription of the evening, Par. Loſt, book 4. verſ. 598.—609.

Ye gentle gales, beneath my body blow,
And ſoftly lay me on the waves below.
Pope's Sappho.

of what is ugly, violent, or diſagreeable (x). This too is according to the nature of common language; for we generally employ harſher tones of voice to expreſs what we diſlike, and more melodious notes to deſcribe the objects of love, complacency, or admiration. Harſh numbers, however, ſhould not be frequent in poetry. For in this art, as in muſic, concord and melody ought always to predominate. And we find in fact, that good poets can occaſionally expreſs themſelves ſomewhat harſhly, when the ſubject requires it, and yet preſerve the ſweetneſs and majeſty of poetical diction.—Further, the voice of complaint, pity, love, and all the gentler affections, is mild and muſical, and ſhould therefore be imitated in muſical numbers; while deſpair, defiance, revenge, and turbulent emotions in general, aſſume an abrupt and ſonorous cadence. Dignity of deſcription (y), ſolemn vows (z), and all ſentiments that proceed from a mind elevated with great ideas (A), require a correſpondent pomp of language and verſification.—Laſtly, an irregular or uncommon movement in the verſe, may ſometimes be of uſe, to make the reader conceive an image in a particular manner. Virgil, deſcribing horſes running over rocky heights at full ſpeed, begins the line with two dactyls, to imitate rapidity, and concludes it with eight long ſyllables:

> Saxa per, et ſcopulos, et depreſſas convalles.
> *Geor.* III. 276.

which is a very unuſual meaſure, but ſeems well adapted to the thing expreſſed, namely, to the deſcent of the animal from the hills to the low ground. At any rate, this extraordinary change of the rhythm may be allowed to bear ſome reſemblance to the animal's change of motion, as it would be felt by a rider, and as we may ſuppoſe it is felt by the animal itſelf.

Other forms of imitative harmony, and many other examples, beſides thoſe referred to in the margin, will readily occur to all who are converſant in the writings of the beſt verſifiers, particularly Homer, Virgil, Milton, Lucretius, Spenſer, Dryden, Shakeſpeare, Pope, and Gray.

PART II. OF THE DIFFERENT SPECIES OF POETRY, with their PARTICULAR PRINCIPLES.

SECT. I. *Of Epic and Dramatic Compoſitions.*

§ 1. *The Epopee and Drama compared.*

Elem. of Criticiſm.

21. TRAGEDY and the epic differ not in ſubſtantials: in both the ſame ends are propoſed, *viz.* inſtruction and amuſement; and in both the ſame mean is employed, *viz.* imitation of human actions. They differ only in the manner of imitating: epic poetry employs narration; tragedy repreſents its facts as paſſing in our ſight: in the former, the poet introduces himſelf as an hiſtorian; in the latter, he preſents his actors, and never himſelf.

This difference, regarding form only, may be thought ſlight: but the effects it occaſions, are by no means ſo; for what we ſee makes a deeper impreſſion than what we learn from others. A narrative poem is a ſtory told by another: facts and incidents paſſing upon the ſtage, come under our own obſervation; and are beſide much enlivened by action and geſture, expreſſive of many ſentiments beyond the reach of language.

A dramatic compoſition has another property, independent altogether of action; which is, that it makes a deeper impreſſion than narration: in the former, perſons expreſs their own ſentiments; in the latter, ſentiments are related at ſecond-hand. For that reaſon, Ariſtotle, the father of critics, lays it down as a rule*, That in an epic poem the author ought to take every opportunity of introducing his actors, and of confining the narrative part within the narroweſt bounds. Homer underſtood perfectly the advantage of this method; and his poems are both of them in a great meaſure dramatic. Lucan runs to the oppoſite extreme: and is guilty of a ſtill greater fault, in ſtuffing his *Pharſalia* with cold and languid reflections, the merit of which he aſſumes to himſelf, and deigns not to ſhare with his actors. Nothing can be more injudiciouſly timed, than a chain of ſuch reflections, which ſuſpend the battle of Pharſalia after the leaders had made their ſpeeches, and the two armies are ready to engage †.

* *Poet* chap. 25. ſect. 6.

† *Lib.* 7. from line 385 to lin 460.

Ariſtotle, from the nature of the fable, divides tragedy into ſimple and complex: but it is of greater moment, with reſpect to dramatic as well as epic poetry, to found a diſtinction upon the different ends attained by ſuch compoſitions. A poem, whether dramatic or epic, that has nothing in view but to move the paſſions and to exhibit pictures of virtue and vice, may be diſtinguiſhed by the name of *pathetic*: but where a ſtory is purpoſely contrived to illuſtrate ſome moral truth, by ſhowing that diſorderly paſſions naturally lead to external misfortunes, ſuch compoſition may be denominated *moral*. Beſide making a deeper impreſſion than can be done by cool reaſoning, a moral poem does not fall ſhort of reaſoning in affording conviction: the natural connection of vice with miſery, and of virtue with happineſs, may be illuſtrated by ſtating a fact as well as by urging an argument. Let us aſſume, for example, the following moral truths: That diſcord among the chiefs renders ineffectual all common meaſures; and that the conſequences of a ſlightly-founded quarrel, foſtered by pride and arrogance, are not leſs fatal than thoſe of the groſſeſt injury: theſe truths may be inculcated, by the quarrel between Agamemnon and Achilles at the ſiege of Troy. If facts or circumſtances be wanting, ſuch as tend to rouſe the turbulent paſſions, they muſt be invented; but no accidental nor unaccountable event ought to be admitted; for the neceſſary or probable connection between vice and miſery is not learned from any events but what are naturally occaſioned by the characters and paſſions of the perſons repreſented, acting in ſuch circumſtances. A real event of which we ſee not the cauſe, may afford a leſſon, upon the preſumption that what hath happened may again happen: but this cannot be inferred from a ſtory that is known to be a fiction.

(x) Stridenti ſtipula miſerum diſperdere carmen.
Virg. Ecl. 3.

Immo ego Sardois videar tibi amarior herbis,
Horridior ruſco, projecta vilius alga. *Virg. Ecl.* 7.

Neu patriæ validas in viſcera vertite vires.
Virg. Æneid. 6.

See alſo Milton's deſcription of the Lazar-houſe in Paradiſe Loſt, b. 11. v. 477.—492.

(y) See Virg. Geor. I. 328. and Homer, Virgil, and Milton, *paſſim.* See alſo Dryden's Alexander's Feaſt, and Gray's Odes.

(z) See Virg. Æneid. IV. 24.

(A) Examples are frequent in the great authors. See Othello's exclamation:

——————— O now for ever
Farewell the tranquil mind! &c. *Act* 3. *Sc.* 3.

Many are the good effects of ſuch compoſitions. A pathetic compoſition, whether epic or dramatic, tends to a habit of virtue, by exciting us to do what is right, and reſtraining us from what is wrong. Its frequent pictures of human woes, produce, beſide, two effects extremely ſalutary: they improve our ſympathy, and fortify us to bear our own misfortunes. A moral compoſition muſt obviouſly produce the ſame good effects, becauſe by being moral it ceaſeth not to be pathetic: it enjoys beſide an excellence peculiar to itſelf; for it not only improves the heart, as above-mentioned, but inſtructs the head by the moral it contains. It ſeems impoſſible to imagine any entertainment more ſuited to a rational being, than a work thus happily illuſtrating ſome moral truth; where a number of perſons of different characters are engaged in an important action, ſome retarding, others promoting, the great cataſtrophe; and where there is dignity of ſtyle as well as of matter. A work of this kind has our ſympathy at command, and can put in motion the whole train of the ſocial affections: our curioſity in ſome ſcenes is excited, in others gratified; and our delight is conſummated at the cloſe, upon finding, from the characters and ſituations exhibited at the commencement, that every incident down to the final cataſtrophe is natural, and that the whole in conjunction make a regular chain of cauſes and effects.

Conſidering that an epic and a dramatic poem are the ſame in ſubſtance, and have the ſame aim or end, one will readily imagine, that ſubjects proper for the one muſt be equally proper for the other. But conſidering their difference as to form, there will be found reaſon to correct that conjecture, at leaſt in ſome degree. Many ſubjects may indeed be treated with equal advantage in either form: but the ſubjects are ſtill more numerous for which they are not equally qualified; and there are ſubjects proper for the one, and not at all for the other. To give ſome ſlight notion of the difference, as there is no room here for enlarging upon every article, we obſerve, that dialogue is better qualified for expreſſing ſentiments, and narrative for diſplaying facts. Heroiſm, magnanimity, undaunted courage, and other elevated virtues, figure beſt in action: tender paſſions, and the whole tribe of ſympathetic affections, figure beſt in ſentiment. It clearly follows, that tender paſſions are more peculiarly the province of tragedy, grand and heroic actions of epic poetry.

22. We have no occaſion to ſay more upon the epic, conſidered as peculiarly adapted to certain ſubjects. But as dramatic ſubjects are more complex, it is neceſſary to take a narrower view of them; which we do the more willingly, in order to clear a point thrown into great obſcurity by critics.

The ſubject beſt fitted for tragedy is where a man has himſelf been the cauſe of his misfortune; not ſo as to be deeply guilty, nor althogether innocent: the misfortune muſt be occaſioned by a fault incident to human nature, and therefore in ſome degree venial. Such misfortunes call forth the ſocial affections, and warmly intereſt the ſpectator. An accidental misfortune, if not extremely ſingular, doth not greatly move our pity: the perſon who ſuffers, being innocent, is freed from the greateſt of all torments, that anguiſh of mind which is occaſioned by remorſe. An atrocious criminal, on the other hand, who brings misfortunes upon himſelf, excites little pity, for a different reaſon: his remorſe, it is true, aggravates his diſtreſs, and ſwells the firſt emotions of pity; but then our hatred of him as a criminal blending with pity, blunts its edge conſiderably. Misfortunes that are not innocent, nor highly criminal, partake the advantages of each extreme: they are attended with remorſe to embitter the diſtreſs, which raiſes our pity to a great height; and the ſlight indignation we have at a venial fault, detracts not ſenſibly from our pity. The happieſt of all ſubjects accordingly for raiſing pity, is where a man of integrity falls into a great misfortune by doing an action that is innocent, but which, by ſome ſingular means, is conceived by him to be criminal: his remorſe aggravates his diſtreſs; and our compaſſion, unreſtrained by indignation, knows on bounds. Pity comes thus to be the ruling paſſion of a pathetic tragedy; and, by proper repreſentation, may be raiſed to a height ſcarce exceeded by any thing felt in real life. A moral tragedy takes in a larger field; as it not only exerciſes our pity, but raiſes another paſſion, which, though ſelfiſh, deſerves to be cheriſhed equally with the ſocial affection. The paſſion we have in view is fear or terror; for when a misfortune is the natural conſequence of ſome wrong bias in the temper, every ſpectator who is conſcious of ſuch a bias in himſelf, takes the alarm, and dreads his falling into the ſame misfortune: and by the emotion of fear or terror, frequently reiterated in a variety of moral tragedies, the ſpectators are put upon their guard againſt the diſorders of paſſion.

The commentators upon Ariſtotle, and other critics, have been much graveled about the account given of tragedy by that author: "That by means of pity and terror, it refines or purifies in us all ſorts of paſſion." But no one who has a clear conception of the end and effects of a good tragedy, can have any difficulty about Ariſtotle's meaning: Our pity is engaged for the perſons repreſented; and our terror is upon our own account. Pity indeed is here made to ſtand for all the ſympathetic emotions, becauſe of theſe it is the capital. There can be no doubt, that our ſympathetic emotions are refined or improved by daily exerciſe; and in what manner our other paſſions are refined by terror, has been juſt now ſaid. One thing is certain, that no other meaning can juſtly be given to the foregoing doctrine than that now mentioned; and that it was really

Ariſtotle's meaning, appears from his 13th chapter, where he delivers ſeveral propoſitions conformable to the doctrine as here explained. Theſe, at the ſame time, we take liberty to mention; becauſe, ſo far as authority can go, they confirm the forgoing reaſoning about ſubjects proper for tragedy. The firſt propoſition is, That it being the province of tragedy to excite pity and terror, an innocent perſon falling into adverſity ought never to be the ſubject. This propoſition is a neceſſary conſequence of his doctrine as explained: a ſubject of that nature may indeed excite pity and terror; but the former in an inferior degree, and the latter in no degree for moral inſtruction. The ſecond propoſition is, That the hiſtory of a wicked perſon in a change from miſery to happineſs, ought not to be repreſented; which excites neither terror nor compaſſion, nor is agreeable in any reſpect. The third is, That the miſfortunes of a wicked perſon ought not to be repreſented: ſuch repreſentation may be agreeable in ſome meaſure upon a principle of juſtice; but it will not move our pity; nor any degree of terror, except in thoſe of the ſame vicious diſpoſition with the perſon repreſented. The laſt propoſition is, That the only character fit for repreſentation lies in the middle, neither eminently good nor eminently bad; where the miſfortune is not the effect of deliberate vice, but of ſome involuntary fault, as our author expreſſes it. The only objection we find to Ariſtotle's account of tragedy, is, that he confines it within too narrow bounds, by refuſing admittance to the pathetic kind: for if terror be eſſential to tragedy, no repreſentation deſerves that name but the moral kind, where the miſfortunes exhibited are cauſed by a wrong balance of mind, or ſome diſorder in the internal conſtitution: ſuch miſfortunes always ſuggeſt moral inſtruction; and by ſuch miſfortunes only, can terror be excited for our improvement.

Thus Ariſtotle's four propoſitions above-mentioned, relates ſolely to tragedies of the moral kind. Thoſe of the pathetic kind, are not confined within ſo narrow limits: ſubjects fitted for the theatre, are not in ſuch plenty as to make us reject innocent miſfortunes which rouſe our ſympathy, though they inculcate no moral. With reſpect indeed to the ſubjects of that kind, it may be doubted, whether the concluſion ought not always to be fortunate. Where a perſon of integrity is repreſented as ſuffering to the end under miſfortunes purely accidental, we depart diſcontented, and with ſome obſcure ſenſe of injuſtice: for ſeldom is man ſo ſubmiſſive to Providence, as not to revolt againſt the tyranny and vexations of blind chance; he will be tempted to ſay, This ought not to be. We give for an example the *Romeo and Juliet* of Shakeſpeare, where the fatal cataſtrophe is occaſioned by Friar Laurence's coming to the monument a minute too late: we are vexed at the unlucky chance, and go away diſſatisfied. Such impreſſions, which ought not to be cheriſhed, are a ſufficient reaſon for excluding ſtories of this kind from the theatre. The miſfortunes of a virtuous perſon, ariſing from neceſſary cauſes, or from a chain of unavoidable circumſtances, will be conſidered in a different light. Chance, giving an impreſſion of anarchy and miſrule, produces always a gloomy proſpect: on the contrary, a regular chain of cauſes and effects directed by the general laws of nature, never fails to ſuggeſt the hand of Providence; to which we ſubmit without reſentment, being conſcious that ſubmiſſion is our duty. For that reaſon, we are not diſguſted with the diſtreſſes of Voltaire's *Mariamne*, though redoubled on her till her death, without the leaſt fault or failing on her part: her miſfortunes are owing to a cauſe extremely natural, and not unfrequent, the jealouſy of a barbarous huſband. The fate of Deſdemona in the *Moor of Venice*, affects us in the ſame manner. We are not ſo eaſily reconciled to the fate of Cordelia in *King Lear:* the cauſes of her miſfortune are by no means ſo evident, as to exclude the gloomy notion of chance. In ſhort, a perfect character ſuffering under miſfortunes, is qualified for being the ſubject of a pathetic tragedy, provided chance be excluded. Nor is a perfect character altogether inconſiſtent with a moral tragedy: it may ſucceſsfully be introduced as an under-part, if the chief place be filled with an imperfect character from which a moral can be drawn. This is the caſe of Deſdemona and Mariamne juſt mentioned; and it is the caſe of Monimia and Belvidera, in Otway's two tragedies, *The Orphan* and *Venice preſerv'd*.

According to our author *, fable operates on our paſſions, by repreſenting its events as paſſing in our ſight, and by deluding us into a conviction of reality. Hence, in epic and dramatic compoſitions, every circumſtance ought to be employed that may promote the deluſion; ſuch as the borrowing from hiſtory ſome noted event, with the addition of circumſtances that may anſwer the author's purpoſe: the principal facts are known to be true; and we are diſpoſed to extend our belief to every circumſtance. But in chooſing a ſubject that makes a figure in hiſtory, greater precaution is neceſſary than where the whole is a fiction. In the latter caſe there is full ſcope for invention; the author is under no reſtraint other than that the characters and incidents be juſt copies of nature. But where the ſtory is founded on truth, no circumſtances muſt be added, but ſuch as connect naturally with what are known to be true; hiſtory may be ſupplied, but muſt not be contradicted. Further, the ſubject choſen muſt be diſtant in time, or at leaſt in place; for the familiarity of recent perſons and events ought to be avoided. Familiarity ought more eſpecially to be avoided in an epic poem, the peculiar character of which is dignity and elevation: modern manners make but a poor figure in ſuch a poem. Their familiarity unqualifies them for a lofty ſubject. The dignity of them will be better underſtood in future ages, when they are no longer familiar.

After Voltaire, no writer, it is probable, will think of rearing an epic poem upon a recent event in the hiſtory of his own country. But an event of that kind is perhaps not altogether unqualified for tragedy: it was admitted in Greece; and Shakeſpeare has employed it ſucceſsfully in ſeveral of his pieces. One advantage it poſſeſſes above fiction, that of more readily engaging our belief, which tends above any other particular to raiſe our ſympathy. The ſcene of comedy is generally laid at home: familiarity is no objection; and we are peculiarly ſenſible of the ridicule of our own manners.

After a proper ſubject is choſen, the dividing it into parts requires ſome art. The concluſion of a book in

---

* Ld Kames, Elem. of Crit. ch. ii. part i. § 7.

Elem. of Criticiſm, ch. 22.

in an epic poem, or of an act in a play, cannot be altogether arbitrary; nor be intended for ſo ſlight a purpoſe as to make the parts of equal length. The ſuppoſed pauſe at the end of every book, and the real pauſe at the end of every act, ought always to coincide with ſome pauſe in the action. In this reſpect, a dramatic or epic poem ought to reſemble a ſentence or period in language, divided into members that are diſtinguiſhed from each other by proper pauſes; or it ought to reſemble a piece of muſic, having a full cloſe at the end, preceded by imperfect cloſes that contribute to the melody. Every act in a dramatic poem ought therefore to cloſe with ſome incident that makes a pauſe in the action; for otherwiſe there can be no pretext for interrupting the repreſentation. It would be abſurd to break off in the very heat of action; againſt which every one would exclaim: the abſurdity ſtill remains where the action relents, if it be not actually ſuſpended for ſome time. This rule is alſo applicable to an epic poem: though in it a deviation from the rule is leſs remarkable; becauſe it is in the reader's power to hide the abſurdity, by proceeding inſtantly to another book. The firſt book of Paradiſe Loſt ends without any cloſe, perfect or imperfect: it breaks off abruptly, where Satan, ſeated on his throne, is prepared to harangue the convocated hoſt of the fallen angels; and the ſecond book begins with the ſpeech. Milton ſeems to have copied the Æneid, of which the two firſt books are divided much in the ſame manner. Neither is there any proper pauſe at the end of the ſeventh book of Paradiſe Loſt, nor at the end of the eleventh. In the Iliad little attention is given to this rule.

This branch of the ſubject ſhall be cloſed with a general rule, That action being the fundamental part of every compoſition, whether epic or dramatic, the ſentiments and tone of language ought to be ſubſervient to the action, ſo as to appear natural, and proper for the occaſion. The application of this rule to our modern plays, would reduce the bulk of them to a ſkeleton.

§ 2. *Reſpective peculiarities of the Epopee and Drama.*

23. In a theatrical entertainment, which employs both the eye and the ear, it would be a groſs abſurdity to introduce upon the ſtage ſuperior beings in a viſible ſhape. There is no place for ſuch objection in an *epic poem;* and Boileau, with many other critics, declares ſtrongly for that ſort of machinery in an epic poem. But waving authority, which is apt to impoſe upon the judgment, let us draw what light we can from reaſon. We may in the firſt place obſerve, that this matter is but indiſtinctly handled by critics: the poetical privilege of animating inſenſible objects for enlivening a deſcription, is very different from what is termed *machinery*, where deities, angels, devils, or other ſupernatural powers, are introduced as real perſonages, mixing in the action, and contributing to the cataſtrophe; and yet theſe two things are conſtantly jumbled together in reaſoning. The former is founded on a natural principle: but nothing is more unnatural than the latter. Its effects, at the ſame time, are deplorable. Firſt, it gives an air of fiction to the whole; and prevents that impreſſion of reality which is requiſite to intereſt our affections, and to move our paſſions: which of itſelf is ſufficient to explode machinery, whatever entertainment it may afford to readers of a fantaſtic taſte or irregular imagination. And, next, were it poſſible, by diſguiſing the fiction, to delude us into a notion of reality, an inſuperable objection would ſtill remain, which is, that the aim or end of an epic poem can never be attained in any perfection where machinery is introduced; for an evident reaſon, that virtuous emotions cannot be raiſed ſucceſsfully but by the actions of thoſe who are endued with paſſions and affections like our own, that is, by human actions: and as for moral inſtruction, it is clear, that none can be drawn from beings who act not upon the ſame principles with us. A fable in Æſop's manner is no objection to this reaſoning: his lions, bulls, and goats, are truly men under diſguiſe; they act and feel in every reſpect as human beings; and the moral we draw is founded on that ſuppoſition. Homer, it is true, introduces the gods into his fable: but the religion of his country authoriſed that liberty; it being an article in the Grecian creed, that the gods often interpoſe viſibly and bodily in human affairs. It muſt however be obſerved, that Homer's deities do no honour to his poems: fictions that tranſgreſs the bounds of nature, ſeldom have a good effect; they may inflame the imagination for a moment, but will not be reliſhed by any perſon of a correct taſte. They may be of ſome uſe to the lower rank of writers; but an author of genius has much finer materials of Nature's production, for elevating his ſubject, and making it intereſting.

One would be apt to think, that Boileau, declaring for the Heathen deities, intended them only for embelliſhing the diction: but unluckily he baniſhes angels and devils, who undoubtedly make a figure in poetic language, equal to the Heathen deities. Boileau, therefore, by pleading for the latter in oppoſition to the former, certainly meant, if he had any diſtinct meaning, that the Heathen deities may be introduced as actors. And, in fact, he himſelf is guilty of that glaring abſurdity, where it is not ſo pardonable as in an epic poem: In his ode upon the taking of Namur, he demands with a moſt ſerious countenance, whether the walls were built by Apollo or Neptune: and in relating the paſſage of the Rhine, *anno* 1672, he deſcribes the god of that river as fighting with all his might to oppoſe the French monarch; which is confounding fiction with reality at a ſtrange rate. The French writers in general run into this error: wonderful the effect of cuſtom, entirely to hide from them how ridiculous ſuch fictions are!

That this is a capital error in *Gieruſalemme liberata*, Taſſo's greateſt admirers muſt acknowledge: a ſituation can never be intricate, nor the reader ever in pain about the cataſtrophe, ſo long as there is an angel, devil, or magician, to lend a helping hand. Voltaire, in his eſſay upon epic poetry, talking of the *Pharſalia*, obſerves judiciouſly, "That the proximity of time, the notoriety of events, the character of the age, enlightened and political, joined with the ſolidity of Lucan's ſubject, deprived him of poetical fiction." Is it not amazing, that a critic who reaſons ſo juſtly with reſpect to others, can be ſo blind with reſpect to himſelf? Voltaire, not ſatisfied to enrich his language with images drawn from inviſible and ſuperior

rior beings, introduces them into the action: in the ſixth canto of the *Henriade*, St Louis appears in perſon, and terrifies the ſoldiers; in the ſeventh canto, St Louis ſends the god of Sleep to Henry; and, in the tenth, the demons of Diſcord, Fanaticiſm, War, &c. aſſiſt Aumale in a ſingle combat with Turenne, and are driven away by a good angel brandiſhing the ſword of God. To blend ſuch fictitious perſonages in the ſame action with mortals, makes a bad figure at any rate; and is intolerable in a hiſtory ſo recent as that of Henry IV. But perfection is not the lot of man.

But perhaps the moſt ſucceſsful weapon that can be employed upon this ſubject is ridicule. Addiſon has applied this in an elegant manner: "Whereas the time of a general peace is, in all appearance, drawing near; being informed that there are ſeveral ingenious perſons who intend to ſhew their talents on ſo happy an occaſion, and being willing, as much as in me lies, to prevent that effuſion of nonſenſe which we have good cauſe to apprehend; I do hereby ſtrictly require every perſon who ſhall write on this ſubject, to remember that he is a Chriſtian, and not to ſacrifice his catechiſm to his poetry. In order to it, I do expect of him, in the firſt place, to make his own poem, without depending upon Phœbus for any part of it, or calling out for aid upon any of the Muſes by name. I do likewiſe poſitively forbid the ſending of Mercury with any particular meſſage or diſpatch relating to the peace; and ſhall by no means ſuffer Minerva to take upon her the ſhape of any plenipotentiary concerned in this great work. I do further declare, that I ſhall not allow the Deſtinies to have had a hand in the deaths of the ſeveral thouſands who have been ſlain in the late war; being of opinion that all ſuch deaths may be well accounted for by the Chriſtian ſyſtem of powder and ball. I do therefore ſtrictly forbid the Fates to cut the thread of man's life upon any pretence whatſoever, unleſs it be for the ſake of rhyme. And whereas I have good reaſon to fear, that Neptune will have a great deal of buſineſs on his hands in ſeveral poems which we may now ſuppoſe are upon the anvil, I do alſo prohibit his appearance, unleſs it be done in metaphor, ſimile, or any very ſhort alluſion; and that even here he may not be permitted to enter, but with great caution and circumſpection. I deſire that the ſame rule may be extended to his whole fraternity of Heathen gods; it being my deſign to condemn every poem to the flames in which Jupiter thunders, or exerciſes any other act of authority which does not belong to him. In ſhort, I expect that no Pagan agent ſhall be introduced, or any fact related which a man cannot give credit to with a good conſcience. Provided always, that nothing herein contained ſhall extend, or be conſtrued to extend, to ſeveral of the female poets in this nation, who ſhall ſtill be left in full poſſeſſion of their gods and goddeſſes, in the ſame manner as if this paper had never been written." *Spect.* n° 523.

The marvellous is indeed ſo much promoted by machinery, that it is not wonderful to find it embraced by the bulk of writers, and perhaps of readers. If indulged at all, it is generally indulged to exceſs. Homer introduceth his deities with no greater ceremony than his mortals; and Virgil has ſtill leſs moderation: a pilot ſpent with watching cannot fall aſleep and drop into the ſea by natural means: one bed cannot receive the two lovers Æneas and Dido, without the immediate interpoſition of ſuperior powers. The ridiculous in ſuch fictions, muſt appear even thro' the thickeſt veil of gravity and ſolemnity.

Angels and devils ſerve equally with Heathen deities as materials for figurative language; perhaps better among Chriſtians, becauſe we believe in them, and not in Heathen deities. But every one is ſenſible, as well as Boileau, that the inviſible powers in our creed make a much worſe figure as actors in a modern poem, than the inviſible powers in the Heathen creed did in ancient poems; the cauſe of which is not far to ſeek. The Heathen deities, in the opinion of their votaries, were beings elevated one ſtep only above mankind, ſubject to the ſame paſſions, and directed by the ſame motives; therefore not altogether improper to mix with men in an important action. In our creed, ſuperior beings are placed at ſuch a mighty diſtance from us, and are of a nature ſo different, that with no propriety can we appear with them upon the ſame ſtage: man, a creature much inferior, loſes all dignity in the compariſon.

There can be no doubt, that an hiſtorical poem admits the embelliſhment of allegory, as well as of metaphor, ſimile, or other figure. Moral truth, in particular, is finely illuſtrated in the allegorical manner: it amuſes the fancy to find abſtract terms, by a ſort of magic, metamorphoſed into active beings; and it is delightful to trace a general propoſition in a pictured event. But allegorical beings ſhould be confined within their own ſphere, and never be admitted to mix in the principal action, nor to co-operate in retarding or advancing the cataſtrophe; which would have a ſtill worſe effect than inviſible powers. For the impreſſion of real exiſtence, eſſential to an epic poem, is inconſiſtent with that figurative exiſtence which is eſſential to an allegory; and therefore no method can more effectually prevent the impreſſion of reality, than the introduction of allegorical beings co-operating with thoſe whom we conceive to be really exiſting. The love-epiſode in the *Henriade* (canto 9.) inſufferable by the diſcordant mixture of allegory with real life, is copied from that of Rinaldo and Armida, in the *Gieruſalemme liberata*, which hath no merit to entitle it to be copied. An allegorical object, ſuch as Fame in the *Æneid*, and the temple of Love in the *Henriade*, may find place in a deſcription: but to introduce Diſcord as a real perſonage, imploring the aſſiſtance of Love as another real perſonage, to enervate the courage of the hero, is making theſe figurative beings act beyond their ſphere, and creating a ſtrange jumble of truth and fiction. The allegory of Sin and Death in the *Paradiſe Loſt*, is poſſibly not generally reliſhed, though it is not entirely of the ſame nature with what we have been condemning: in a work comprehending the atchievements of ſuperior beings, there is more room for fancy than where it is confined to human actions.

What is the true notion of an epiſode? or how is it to be diſtinguiſhed from the principal action? Every incident that promotes or retards the cataſtrophe, muſt be part of the principal action. This clears the nature of an epiſode; which may be defined, "An incident connected with the principal action, but contributing neither to advance nor retard it." The deſcent of Æneas into hell doth not advance nor retard the cataſtrophe, and therefore is an epiſode. The ſtory of Niſus and Euryalus, producing an alteration in the affairs of the contending parties, is a part of the principal action. The family-ſcene in the ſixth book of the Iliad is of the ſame nature; for by Hector's retiring from the field of battle to viſit his wife, the Grecians had opportunity to breathe, and even to turn upon the Trojans. The unavoidable effect of an epiſode according to this definition muſt be, to break the unity of action; and therefore it ought never to be indulged unleſs to unbend the mind after the fatigue of a long narration. An epiſode, when ſuch is its purpoſe, requires the following conditions: it ought to be well connected with the principal action; it ought to be lively and intereſting; it ought to be ſhort; and a time ought to be choſen when the principal action relents (K).

In the following beautiful epiſode, which cloſes the ſecond book of Fingal, all theſe conditions are united.

"Comal was a ſon of Albion; the chief of an hundred hills. His deer drunk of a thouſand ſtreams; and a thouſand rocks replied to the voice of his dogs. His face was the mildneſs of youth; but his hand the death of heroes. One was his love, and fair was ſhe! the daughter of mighty Conloch. She appeared like a ſun-beam among women, and her hair was like the wing of the raven. Her ſoul was fixed on Comal, and ſhe was his companion in the chace. Often met their eyes of love, and happy were their words in ſecret. But Gormal loved the maid, the chief of gloomy Ardven. He watched her lone ſteps on the heath, the foe of unhappy Comal.

"One day tired of the chace, when the miſt had concealed their friends, Comal and the daughter of Conloch met in the cave of Ronan. It was the wonted haunt of Comal. Its ſides were hung with his arms; a hundred ſhields of thongs were there, a hundred helms of ſounding ſteel. Reſt here, ſaid he, my love Galvina, thou light of the cave of Ronan: a deer appears on Maro's brow; I go, but ſoon will return. I fear, ſaid ſhe, dark Gormal my foe: I will reſt here; but ſoon return, my love.

"He went to the deer of Mora. The daughter of Conloch, to try his love, cloathed her white ſide with his armour, and ſtrode from the cave of Ronan. Thinking her his foe, his heart beat high, and his colour changed. He drew the bow: the arrow flew: Galvina fell in blood. He ran to the cave with haſty ſteps, and called the daughter of Conloch. Where art thou, my love? but no anſwer——He marked, at length, her heaving heart beating againſt the mortal arrow. O Conloch's daughter, is it thou! he ſunk upon her breaſt.

"The hunters found the hapleſs pair. Many and ſilent were his ſteps round the dark dwellings of his love. The fleet of the ocean came: he fought, and the ſtrangers fell: he ſearched for death over the field; but who could kill the mighty Comal? Throwing away his ſhield, an arrow found his manly breaſt. He ſleeps with his Galvina: their green tombs are ſeen by the mariner, when he bounds on the waves of the north."

24. Next, upon the peculiarities of a *dramatic poem*. And the firſt we ſhall mention is a double plot: one of which muſt reſemble an epiſode in an epic poem; for it would diſtract the ſpectator, inſtead of entertaining him, if he were forced to attend, at the ſame time, to two capital plots equally intereſting. And even ſuppoſing it an under-plot like an epiſode, it ſeldom hath a good effect in tragedy, of which ſimplicity is a chief property; for an intereſting ſubject that engages our affections, occupies our whole attention, and leaves no room for any ſeparate concern. Variety is more tolerable in comedy; which pretends only to amuſe, without totally occupying the mind. But even there, to make a double plot agreeable, is no ſlight effort of art: the under-plot ought not to vary greatly in its tone from the principal; for diſcordant emotions are unpleaſant when jumbled together; which, by the way, is an inſuperable objection to tragi-comedy. Upon that account, the *Provok'd Huſband* deſerves cenſure: all the ſcenes that bring the family of the Wrongheads into action, being ludicrous and farcical, are in a very different tone from the principal ſcenes, diſplaying ſevere and bitter expoſtulations between Lord Townley and his lady. The ſame objection touches not the double plot of the *Careleſs Huſband;* the different ſubjects being ſweetly connected, and having only ſo much variety as to reſemble ſhades of colours harmoniouſly mixed. But this is not all. The under-plot ought to be connected with that which is principal, ſo much at leaſt as to employ the ſame perſons: the under-plot ought to occupy the intervals or pauſes of the principal action; and both ought to be concluded together. This is the caſe of the *Merry Wives of Windſor*.

Violent action ought never to be repreſented on the ſtage. While the dialogue goes on, a thouſand particulars concur to delude us into an impreſſion of reality; genuine ſentiments, paſſionate language, and perſuaſive geſture: the ſpectator once engaged, is willing to be deceived, loſes ſight of himſelf, and without ſcruple enjoys the ſpectacle as a reality. From this abſent ſtate, he is rouſed by violent action: he wakes as from a pleaſing dream, and, gathering his ſenſes about him, finds all to be a fiction. Horace delivers the ſame rule; and founds it upon the ſame reaſon:

> Ne pueros coram populo Medea trucidet;
> Aut humana palam coquat exta nefarius Atreus;
> Aut in avem Progne vertatur, Cadmus in anguem:
> Quodcumque oſtendis mihi ſic, incredulus odi.

The French critics join with Horace in excluding blood from the ſtage; but, overlooking the moſt ſubſtantial objection, they urge only, that it is barbarous and ſhocking to a polite audience. The Greeks had

---

(K) Homer's deſcription of the ſhield of Achilles is properly introduced at a time when the action relents, and the reader can bear an interruption. But the author of Telemachus deſcribes the ſhield of that young hero in the heat of battle; a very improper time for an interruption.

no notion of ſuch delicacy, or rather effeminacy; witneſs the murder of Clytemneſtra by her ſon Oreſtes, paſſing behind the ſcene, as repreſented by Sophocles; her voice is heard calling out for mercy, bitter expoſtulations on his part, loud ſhrieks upon her being ſtabbed, and then a deep ſilence. An appeal may be made to every perſon of feeling, whether this ſcene be not more horrible, than if the deed had been committed in ſight of the ſpectators upon a ſudden guſt of paſſion. If Corneille, in repreſenting the affair between Horatius and his ſiſter, upon which the murder enſues behind the ſcene, had no other view but to remove from the ſpectators a ſhocking action, he was guilty of a capital miſtake: for murder in cold blood, which in ſome meaſure was the caſe as repreſented, is more ſhocking to a polite audience, even where the concluſive ſtab is not ſeen, than the ſame act performed in their preſence by violent and unpremeditated paſſion, as ſuddenly repented of as committed. Addiſon's obſervation is juſt *, That no part of this incident ought to have been repreſented, but reſerved for a narrative, with every alleviating circumſtance in favour of the hero.

25. A few words upon the dialogue, which ought to be ſo conducted as to be a true repreſentation of nature. We talk not here of the ſentiments, nor of the language, (which are treated elſewhere): but of what properly belongs to dialogue-writing; where every ſingle ſpeech, ſhort or long, ought to ariſe from what is ſaid by the former ſpeaker, and furniſh matter for what comes after, till the end of the ſcene. In this view, all the ſpeeches, from firſt to laſt, repreſent ſo many links of one regular chain. No author, ancient or modern, poſſeſſes the art of dialogue equal to Shakeſpeare. Dryden, in that particular, may juſtly be placed as his oppoſite. He frequently introduces three or four perſons ſpeaking upon the ſame ſubject, each throwing out his own notions ſeparately, without regarding what is ſaid by the reſt: take for an example the firſt ſcene of *Aurenzebe*. Sometimes he makes a number club in relating an event, not to a ſtranger, ſuppoſed ignorant of it, but to one another, for the ſake merely of ſpeaking: of which notable ſort of dialogue, we have a ſpecimen in the firſt ſcene of the firſt part of the *Conqueſt of Granada*. In the ſecond part of the ſame tragedy, ſcene ſecond, the King, Abenamar, and Zulema, make their ſeparate obſervations, like ſo many ſoliloquies, upon the fluctuating temper of the mob: a dialogue ſo uncouth, puts one in mind of two ſhepherds in a paſtoral, excited by a prize to pronounce verſes alternately, each in praiſe of his own miſtreſs.

This manner of dialogue-writing, beſide an unnatural air, has another bad effect: it ſtays the courſe of the action, becauſe it is not productive of any conſequence. In Congreve's comedies, the action is often ſuſpended to make way for a play of wit.

No fault is more common among writers, than to prolong a ſpeech after the impatience of the perſon to whom it is addreſſed ought to prompt him or her to break in. Conſider only how the impatient actor is to behave in the mean time. To expreſs his impatience in violent action without interrupting, would be unnatural; and yet to diſſemble his impatience by appearing cool where he ought to be highly inflamed, would be no leſs ſo.

Rhyme being unnatural and diſguſtful in dialogue, is happily baniſhed from our theatre: the only wonder is that it ever found admittance, eſpecially among a people accuſtomed to the more manly freedom of Shakeſpear's dialogue. By baniſhing rhyme, we have gained ſo much as never once to dream that there can be any further improvement. And yet, however ſuitable blank verſe may be to elevated characters and warm paſſions, it muſt appear improper and affected in the mouths of the lower ſort. Why then ſhould it be a rule, That every ſcene in tragedy muſt be in blank verſe? Sakeſpear, with great judgment, has followed a different rule; which is, to intermix proſe with verſe, and only to employ the latter where it is required by the importance or dignity of the ſubject. Familiar thoughts and ordinary facts ought to be expreſſed in plain language: to hear, for example, a footman deliver a ſimple meſſage in blank verſe, muſt appear ridiculous to every one who is not biaſſed by cuſtom. In ſhort, that variety of characters and of ſituations, which is the life of a play, requires not only a ſuitable variety in the ſentiments, but alſo in the diction.

§ 3. *The Three Unities*.

26. When we conſider the chain of cauſes and effects in the material world, independent of purpoſe, deſign, or thought, we find a number of incidents in ſucceſſion, without beginning, middle, or end: every thing that happens is both a cauſe and an effect; being the effect of what goes before, and the cauſe of what follows: one incident may affect us more, another leſs; but all of them are links in the univerſal chain: the mind, in viewing theſe incidents, cannot reſt or ſettle ultimately upon any one; but is carried along in the train without any cloſe.

But when the intellectual world is taken under view, in conjunction with the material, the ſcene is varied. Man acts with deliberation, will, and choice: he aims at ſome end; glory, for example, or riches, or conqueſt, the procuring happineſs to individuals, or to his country in general: he propoſes means, and lays plans to attain the end propoſed. Here are a number of facts or incidents leading to the end in view, the whole compoſing one chain by the relation of cauſe and effect. In running over a ſeries of ſuch facts or incidents, we cannot reſt upon any one; becauſe they are preſented to us as means only, leading to ſome end: but we reſt with ſatisfaction upon the end or ultimate event; becauſe there the purpoſe or aim of the chief perſon or perſons is accompliſhed. This indicates the beginning, the middle, and the end, of what Ariſtotle calls *an entire action* *. The ſtory naturally begins with deſcribing thoſe circumſtances which move the perſon who acts the principal part to form a plan, in order to compaſs ſome deſired event; the proſecution of that plan and the obſtructions, carry the reader into the heat of action: the middle is properly where the action is the moſt involved; and the end is where the event is brought about, and the plan accompliſhed.

We have given the foregoing example of a plan crowned with ſucceſs, becauſe it affords the cleareſt conception of a beginning, a middle, and an end, in which conſiſts *unity* of action; and indeed ſtricter unity cannot be imagined than in that caſe. But an action may have unity, or a beginning, middle, and end, without ſo intimate a relation of parts; as where the cataſtrophe is different from what it is intended or deſired, which frequently happens in our beſt tragedies. In the *Eneid*, the hero, after many obſtructions, makes his plan effectual. The *Iliad* is formed upon a different model: it begins with the quarrel between Achilles and Agamemnon; goes on to deſcribe the ſeveral effects produced by that cauſe; and ends in a reconciliation. Here is unity of action, no doubt, a beginning, a middle, and an end; but inferior to that of the *Eneid:* which will thus appear. The mind hath a propenſity to go forward in the chain of hiſtory; it keeps always in view the expected event; and when the incidents or under-parts are connected by their relation to the event, the mind runs ſweetly and eaſily along them. This pleaſure we have in the *Eneid*. It is not altogether ſo pleaſant to connect, as in the *Iliad*, effects by their common cauſe; for ſuch connection forces the mind to a continual retroſpect: looking backward is like walking backward.

---

* *Spectator*, N° 44.

* *Poet. c.*

Elem. of Criticiſm.

If unity of action be a capital beauty in fable imitative of human affairs, a plurality of unconnected fables muſt be a capital deformity. For the ſake of variety, we indulge an under-plot that is connected with the principal: but two unconnected events are extremely unpleaſant, even where the ſame actors are engaged in both. Arioſto is quite licentious in that particular: he carries on at the ſame time a plurality of unconnected ſtories. His only excuſe is, that his plan is perfectly well adjuſted to his ſubject; for every thing in the *Orlando Furioſo* is wild and extravagant.

Though to ſtate facts in the order of time is natural, yet that order may be varied for the ſake of conſpicuous beauties. If, for example, a noted ſtory, cold and ſimple in its firſt movements, be made the ſubject of an epic poem, the reader may be hurried into the heat of action; reſerving the preliminaries for a converſation-piece, if thought neceſſary; and that method, at the ſame time, hath a peculiar beauty from being dramatic. But a privilege that deviates from nature ought to be ſparingly indulged; and yet romance-writers make no difficulty of preſenting to the reader, without the leaſt preparation, unknown perſons engaged in ſome arduous adventure equally unknown. In *Caſſandra*, two perſonages, who afterward are diſcovered to be the heroes of the fable, ſtart up completely armed upon the banks of the Euphrates, and engage in a ſingle combat.

A play analyſed, is a chain of connected facts, of which each ſcene makes a link. Each ſcene, accordingly, ought to produce ſome incident relative to the cataſtrophe or ultimate event, by advancing or retarding it. A ſcene that produceth no incident, and for that reaſon may be termed *barren*, ought not to be indulged, becauſe it breaks the unity of action: a barren ſcene can never be entitled to a place, becauſe the chain is complete without it. In the *Old Bachelor*, the 3d ſcene of act 2. and all that follow to the end of that act, are mere converſation-pieces, productive of no conſequence. The 10th and 11th ſcenes, act 3. *Double Dealer*, and the 10th, 11th, 12th, 13th, and 14th ſcenes, act 1. *Love for Love*, are of the ſame kind. Neither is *The Way of the World* entirely guiltleſs of ſuch ſcenes. It will be no juſtification, that they help to diſplay characters: it were better, like Dryden in his *dramatis perſonæ*, to deſcribe characters beforehand, which would not break the chain of action. But a writer of genius has no occaſion for ſuch artifice: he can diſplay the characters of his perſonages much more to the life in ſentiment and action How ſucceſsfully is this done by Shakeſpear! in whoſe works there is not to be found a ſingle barren ſcene.

Upon the whole, it appears, that all the facts in an hiſtorical fable, ought to have a mutual connection, by their common relation to the grand event or cataſtrophe. And this relation, in which the *unity* of action conſiſts, is equally eſſential to epic and dramatic compoſitions.

In handling unity of action, it ought not to eſcape obſervation, that the mind is ſatisfied with ſlighter unity in a picture than in a poem; becauſe the perceptions of the former are more lively than the ideas of the latter. In Hogarth's *Enraged Muſician*, we have a collection of every grating ſound in nature, without any mutual connection except that of place. But the horror they give to the delicate ear of an Italian fidler, who is repreſented almoſt in convulſions, beſtows unity upon the piece, with which the mind is ſatisfied.

How far the unities of time and of place are eſſential, is a queſtion of greater intricacy. Theſe unities were ſtrictly obſerved in the Greek and Roman theatres; and they are inculcated by the French and Engliſh critics, as eſſential to every dramatic compoſition. In theory, theſe unities are alſo acknowledged by our beſt poets, though their practice ſeldom correſponds: they are often forced to take liberties, which they pretend not to juſtify, againſt the practice of the Greeks and Romans, and againſt the ſolemn deciſion of their own countrymen. But in the courſe of this inquiry it will be made evident, that in this article we are under no neceſſity to copy the ancients; and that our critics are guilty of a miſtake, in admitting no greater latitude of place and time than was admitted in Greece and Rome.

Indeed the unities of place and time, are not, by the moſt rigid critics, required in a narrative poem. In ſuch compoſition, if it pretend to copy nature, theſe unities would be abſurd; becauſe real events are ſeldom confined within narrow limits either of place or of time: and yet we can follow hiſtory, or an hiſtorical fable, through all its changes, with the greateſt facility: we never once think of meaſuring the real time by what is taken in reading; nor of forming any connection between the place of action and that which we occupy.

We are aware, that the drama differs ſo far from the epic, as to admit different rules. It will be obſerved, "That an hiſtorical fable, intended for reading ſolely, is under no limitation of time nor of place, more than a genuine hiſtory; but that a dramatic compoſition cannot be accurately repreſented, unleſs it be limited, as its repreſentation is, to one place and to a few hours; and therefore that no fable can be admitted but what has theſe properties, becauſe it would be abſurd to compoſe a piece for repreſentation that cannot be juſtly repreſented." This argument has at leaſt a plauſible appearance; and yet one is apt to ſuſpect ſome fallacy, conſidering that no critic, however ſtrict, has ventured to confine the unities of place and of time within ſo narrow bounds.

A view of the Grecian drama, compared with our own, may perhaps relieve us from this dilemma: if they be differently conſtructed, as ſhall be made evident, it is poſſible that the foregoing reaſoning may not be equally applicable to both. This is an article, that, with relation to the preſent ſubject, has not been examined by any writer.

All authors agree, that tragedy in Greece was derived from the hymns in praiſe of Bacchus, which were ſung in parts by a chorus. Theſpis, to relieve the ſingers, and for the ſake of variety, introduced one actor; whoſe province it was to explain hiſtorically the ſubject of the ſong, and who occaſionally repreſented one or other perſonage. Eſchylus, introducing a ſecond actor, formed the dialogue; by which the performance became dramatic; and the actors were multiplied when the ſubject repreſented made it neceſſary. But ſtill, the chorus, which gave a beginning to tragedy, was conſidered as an eſſential part. The firſt ſcene, generally, unfolds the preliminary circumſtances that lead to the grand event; and this ſcene is by Ariſtotle termed the *prologue*. In the ſecond ſcene, where the action properly begins, the chorus is introduced, which, as originally, continues upon the ſtage during the whole performance: the chorus frequently makes one in the dialogue; and when the dialogue happens to be ſuſpended, the chorus, during the interval, is employed in ſinging. Sophocles adheres to this plan religiouſly. Euripides is not altogether ſo correct. In ſome of his pieces it becomes neceſſary to remove the chorus for a little time: but when that unuſual ſtep is riſked, matters are ſo ordered as not to interrupt the repreſentation: the chorus never leave the ſtage of their own accord, but at the command of ſome principal perſonage, who conſtantly waits their return.

Thus the Grecian drama is a continued repreſentation without any interruption; a circumſtance that merits attention. A continued repreſentation without a pauſe, affords not opportunity to vary the place of action, nor to prolong the time of the action beyond that of the repreſentation. To a repreſentation ſo confined in place and time, the foregoing reaſoning is ſtrictly applicable: a real or feigned action that is brought to a concluſion after conſiderable intervals of time and frequent changes of place, cannot accurately be copied in a repreſentation that admits no latitude in either. Hence it is, that the unities of place and of time, were, or ought to have been, ſtrictly obſerved in the Greek tragedies; which is made neceſſary by the very conſtitution of their drama, for it is abſurd to compoſe a tragedy that cannot be juſtly repreſented.

Modern critics, who for our drama pretend to eſtabliſh rules founded on the practice of the Greeks, are guilty of an egregious blunder. The unities of place and of time were in Greece, as we ſee, a matter of neceſſity, not of choice; and it is eaſy to ſhow, that if we ſubmit to ſuch fetters, it muſt be from choice, not neceſſity. This will be evident upon taking a view of the conſtitution of our drama, which differs widely from that of Greece; whether more or leſs perfect, is a different point, to be handled afterward. By dropping the chorus, opportunity is afforded to divide the repreſentation by intervals of time, during which the ſtage is evacuated and the ſpectacle ſuſpended. This qualifies our drama for ſubjects ſpread through a wide ſpace both of time and of place: the time ſuppoſed to paſs during the ſuſpenſion of the repreſentation, is not meaſured by the time of the ſuſpenſion; and any place may be ſuppoſed, as it is not in ſight: by which means, many ſubjects can juſtly be repreſented in our theatres, that were excluded from thoſe of ancient Greece. This doctrine may be illuſtrated, by comparing a modern play to a ſet of hiſtorical pictures; let us ſuppoſe them five in number, and the reſemblance will be complete: each of the pictures reſembles an act in one of our plays: there muſt neceſſarily be the ſtricteſt unity of place and of time in each picture; and the ſame neceſſity requires theſe two unities during each act of a play, becauſe during an act there is no interruption in the ſpectacle. Now, when we view in ſucceſſion a number of ſuch hiſtorical pictures, let it be, for example, the hiſtory of Alexander by Le Brun, we have no difficulty to conceive, that months or years have paſſed between the events exhibited in two different pictures, though the interruption is imperceptible in paſſing our eye from the one to the other; and we have as little difficulty to conceive a change of place, however great: in which view, there is truly no difference between five acts of a modern play, and five ſuch pictures. Where the repreſentation is ſuſpended, we can with the greateſt facility ſuppoſe any length of time or any change of place: the ſpectator, it is true, may be conſcious, that the real time and place are not the ſame with what are employed in the repreſentation; but this is a work of reflection; and by the ſame reflection he may alſo be conſcious, that Garrick is not king Lear, that the playhouſe is not Dover cliffs, nor the noiſe he hears thunder and lightning. In a word, after an interruption of the repreſentation, it is not more difficult for a ſpectator to imagine a new place, or a different time, than, at the commencement of the play, to imagine himſelf at Rome, or in a period of time two thouſand years back. And indeed, it is abundantly ridiculous, that a critic, who is willing to hold candle-light for ſun-ſhine, and ſome painted canvaſſes for a palace or a priſon, ſhould affect ſo much difficulty in imagining a latitude of place or of time in the fable, beyond what is neceſſary in the repreſentation.

There are, it muſt be acknowledged, ſome effects of great latitude in time that ought never to be indulged in a compoſition for the theatre: nothing can be more abſurd, than at the cloſe to exhibit a full-grown perſon who appears a child at the beginning: the mind rejects, as contrary to all probability, ſuch latitude of time as is requiſite for a change ſo remarkable. The greateſt change from place to place hath not altogether the ſame bad effect: in the bulk of human affairs place is not material; and the mind, when occupied with an intereſting event, is little regardful of minute circumſtances: theſe may be varied at will, becauſe they ſcarce make any impreſſion.

At the ſame time, it is not here meant to juſtify liberty without any reſerve. An unbounded licence with relation to place and time, is faulty for a reaſon that ſeems to have been overlooked, which is, that it ſeldom fails to break the unity of action: in the ordinary courſe of human affairs, ſingle events, ſuch as are fit to be repreſented on the ſtage, are confined to a narrow ſpot, and generally employ no great extent of

Elem. of Criticiſm. ch. 23.

of time: we accordingly ſeldom find ſtrict unity of action in a dramatic compoſition, where any remarkable latitude is indulged in theſe particulars. It may even be admitted, that a compoſition which employs but one place, and requires not a greater length of time than is neceſſary for the repreſentation, is ſo much the more perfect; becauſe the confining an event within ſo narrow bounds, contributes to the unity of action, and alſo prevents that labour, however ſlight, which the mind muſt undergo in imagining frequent changes of place, and many intervals of time. But ſtill we muſt inſiſt, that ſuch limitation of place and time as was neceſſary in the Grecian drama, is no rule to us; and therefore, that though ſuch limitation adds one beauty more to the compoſition, it is at beſt but a refinement, which may juſtly give place to a thouſand beauties more ſubſtantial. And we may add, that it is extremely difficult, if not impracticable, to contract within the Grecian limits, any fable ſo fruitful of incidents in number and variety as to give full ſcope to the fluctuation of paſſion.

It may now appear, that critics who put the unities of place and of time upon the ſame footing with the unity of action, making them all equally eſſential, have not attended to the nature and conſtitution of the modern drama. If they admit an interrupted repreſentation, with which no writer finds fault, it is abſurd to reject its greateſt advantage, that of repreſenting many intereſting ſubjects excluded from the Grecian ſtage. If there needs muſt be a reformation, why not reſtore the ancient chorus and the ancient continuity of action? There is certainly no medium; for to admit an interruption without relaxing from the ſtrict unities of place and of time, is in effect to load us with all the inconveniencies of the ancient drama, and at the ſame time to with-hold from us its advantages.

And therefore the only proper queſtion is, Whether our model be or be not a real improvement? This indeed may fairly be called in queſtion; and in order to a comparative trial, ſome particulars muſt be premiſed. When a play begins, we have no difficulty to adjuſt our imagination to the ſcene of action, however diſtant it be in time or in place; becauſe we know that the play is a repreſentation only. The caſe is very different after we are engaged: it is the perfection of repreſentation to hide itſelf, to impoſe on the ſpectator, and to produce in him an impreſſion of reality, as if he were ſpectator of a real event; but any interruption annihilates that impreſſion, by rouſing him out of his waking dream, and unhappily reſtoring him to his ſenſes. So difficult it is to ſupport the impreſſion of reality, that much ſlighter interruptions than the interval between two acts are ſufficient to diſſolve the charm: in the 5th act of the *Mourning Bride*, the three firſt ſcenes are in a room of ſtate, the fourth in a priſon; and the change is operated by ſhifting the ſcene, which is done in a trice: but however quick the tranſition may be, it is impracticable to impoſe upon the ſpectators ſo as to make them conceive that they are actually carried from the palace to the priſon; they immediately reflect, that the palace and priſon are imaginary, and that the whole is a fiction.

From theſe premiſes, one will naturally be led, at firſt view, to pronounce the frequent interruptions in the modern drama to be an imperfection. It will occur, "That every interruption muſt have the effect to baniſh the dream of reality, and with it to baniſh our concern, which cannot ſubſiſt while we are conſcious that all is a fiction; and therefore, that in the modern drama, ſufficient time is not afforded for fluctuation and ſwelling of paſſion, like what is afforded in that of Greece, where there is no interruption." This reaſoning, it muſt be owned, has a ſpecious appearance: but we muſt not become faint-hearted upon the firſt repulſe; let us rally our troops for a ſecond engagement.

Conſidering attentively the ancient drama, we find, that though the repreſentation is never interrupted, the principal action is ſuſpended not leſs frequently than in the modern drama: there are five acts in each; and the only difference is, that in the former, when the action is ſuſpended as it is at the end of every act, opportunity is taken of the interval to employ the chorus in ſinging. Hence it appears, that the Grecian continuity of repreſentation cannot have the effect to prolong the impreſſion of reality: to baniſh that impreſſion, a pauſe in the action while the chorus is employed in ſinging, is no leſs effectual than a total ſuſpenſion of the repreſentation.

But to open a larger view, it may be ſhown, that a repreſentation with proper pauſes, is better qualified for making a deep impreſſion, than a continued repreſentation without a pauſe. This will be evident from the following conſiderations. Repreſentation cannot very long ſupport an impreſſion of reality; for when the ſpirits are exhauſted by cloſe attention and, by the agitation of paſſion, an uneaſineſs enſues, which never fails to baniſh the waking dream. Now ſuppoſing the time that a man can employ with ſtrict attention without wandering, to be no greater than is requiſite for a ſingle act, a ſuppoſition that cannot be far from truth; it follows, that a continued repreſentation of longer endurance than an act, inſtead of giving ſcope to fluctuation and ſwelling of paſſion, would overſtrain the attention, and produce a total abſence of mind. In this reſpect, the four pauſes have a fine effect; for by affording to the audience a ſeaſonable reſpite when the impreſſion of reality is gone, and while nothing material is in agitation, they relieve the mind from its fatigue; and conſequently prevent a wandering of thought at the very time poſſibly of the moſt intereſting ſcenes.

In one article, indeed, the Grecian model has greatly the advantage: its chorus, during an interval, not only preſerves alive the impreſſions made upon the audience, but alſo prepares their hearts finely for new impreſſions. In our theatres, on the contrary, the audience, at the end of every act, being left to trifle time away, loſe every warm impreſſion; and they begin the next act cool and unconcerned, as at the commencement of the repreſentation. This is a groſs malady in our theatrical repreſentations; but a malady that luckily is not incurable: to revive the Grecian chorus, would be to revive the Grecian ſlavery of place and time; but we can figure a detached chorus coinciding with a pauſe in the repreſentation, as the ancient chorus did with a pauſe in the principal action. What objection, for example, can there lie againſt muſic between the acts, vocal and inſtrumental, adapt-

Elem. of Criticiſm. ch. 23.

ed to the ſubject? Such detached chorus, without putting us under any limitation of time or place, would recruit the ſpirits, and would preſerve entire the tone, if not the tide, of paſſion: the muſic, after an act, ſhould commence in the tone of the preceding paſſion, and be gradually varied till it accord with the tone of the paſſion that is to ſucceed in the next act. The muſic and the repreſentation would both of them be gainers by their conjunction; which will thus appear. Muſic that accords with the preſent tone of mind, is, on that account, doubly agreeable; and accordingly, though muſic ſingly hath not power to raiſe a paſſion, it tends greatly to ſupport a paſſion already raiſed. Further, muſic prepares us for the paſſion that follows, by making cheerful, tender, melancholy, or animated impreſſions, as the ſubject requires. Take for an example the firſt ſcene of the *Mourning Bride*, where ſoft muſic, in a melancholy ſtrain, prepares us for Almeria's deep diſtreſs. In this manner, muſic and repreſentation ſupport each other delightfully: the impreſſion made upon the audience by the repreſentation, is a fine preparation for the muſic that ſucceeds; and the impreſſion made by the muſic, is a fine preparation for the repreſentation that ſucceeds. It appears evident, that by ſome ſuch contrivance, the modern drama may be improved, ſo as to enjoy the advantage of the ancient chorus without its ſlaviſh limitation of place and time. But to return to the compariſon between the ancient and the modern drama.

The numberleſs improprieties forced upon the Greek dramatic poets by the conſtitution of their drama, may be ſufficient, one ſhould think, to make us prefer the modern drama, even abſtracting from the improvement propoſed. To prepare the reader for this article, it muſt be premiſed, that as in the ancient drama the place of action never varies, a place neceſſarily muſt be choſen, to which every perſon may have acceſs without any improbability. This confines the ſcene to ſome open place, generally the court or area before a palace; which excludes from the Grecian theatre tranſactions within doors, though theſe commonly are the moſt important. Such cruel reſtraint is of itſelf ſufficient to cramp the moſt pregnant invention; and accordingly the Greek writers, in order to preſerve unity of place, are reduced to woful improprieties. In the *Hippolytus* of Euripides, (act 1. ſc. 6.) Phedra, diſtreſſed in mind and body, is carried without any pretext from her palace to the place of action; is there laid upon a couch, unable to ſupport herſelf upon her limbs; and made to utter many things improper to be heard by a number of women who form the chorus: and what is ſtill more improper, her female attendant uſes the ſtrongeſt intreaties to make her reveal the ſecret cauſe of her anguiſh; which at laſt Phedra, contrary to decency and probability, is prevailed upon to do in preſence of that very chorus, (act 2. ſc. 2.) Alceſtes, in Euripides, at the point of death, is brought from the palace to the place of action, groaning, and lamenting her untimely fate (act 2. ſc. 1.) In the *Trachiniens* of Sophocles, (act 2.), a ſecret is imparted to Dejanira, the wife of Hercules, in preſence of the chorus. In the tragedy of *Iphigenia*, the meſſenger employed to inform Clitemneſtra that Iphigenia was ſacrificed, ſtops ſhort at the place of action, and with a loud voice calls the queen from her palace to hear the news. Again, in the *Iphigenia in Tauris* (act 4.), the neceſſary preſence of the chorus forces Euripides into a groſs abſurdity, which is to form a ſecret in their hearing; and, to diſguiſe the abſurdity, much court is paid to the chorus, not one woman but a number, to engage them to ſecrecy. In the *Medea* of Euripides, that princeſs makes no difficulty, in preſence of the chorus, to plot the death of her huſband, of his miſtreſs, and of her father the king of Corinth, all by poiſon; it was neceſſary to bring Medea upon the ſtage; and there is but one place of action, which is always occupied by the chorus. This ſcene cloſes the ſecond act; and in the end of the third, ſhe frankly makes the chorus her confidents in plotting the murder of her own children. Terence, by identity of place, is often forced to make a converſation within doors be heard on the open ſtreet: the cries of a woman in labour are there heard diſtinctly.

The Greek poets are not leſs hampered by unity of time than by that of place. In the *Hippolytus* of Euripides, that prince is baniſhed at the end of the 4th act; and in the firſt ſcene of the following act, a meſſenger relates to Theſeus the whole particulars of the death of Hippolytus by the ſea-monſter: that remarkable event muſt have occupied many hours; and yet in the repreſentation it is confined to the time employ'd by the chorus upon the ſong at the end of the 4th act. The inconſiſtency is ſtill greater in the *Iphigenia in Tauris* (act 5. ſc. 4.): the ſong could not exhauſt half an hour; and yet the incidents ſuppoſed to have happened during that time, could not naturally have been tranſacted in leſs than half a day.

The Greek artiſts are forced, not leſs frequently, to tranſgreſs another rule, derived alſo from a continued repreſentation. The rule is, that as a vacuity, however momentary, interrupts the repreſentation, it is neceſſary that the place of action be conſtantly occupied. Sophocles, with regard to that rule as well as to others, is generally correct: but Euripides cannot bear ſuch reſtraint; he often evacuates the ſtage, and leaves it empty for others. Iphigenia in Tauris, after pronouncing a ſoliloquy in the firſt ſcene, leaves the place of action, and is ſucceeded by Oreſtes and Pylades: they, after ſome converſation, walk off; and Iphigenia re-enters, accompanied with the chorus. In the Alceſtes, which is of the ſame author, the place of action is void at the end of the 3d act. It is true, that to cover the irregularity, and to preſerve the repreſentation in motion, Euripides is careful to fill the ſtage without loſs of time: but this ſtill is an interruption, and a link of the chain broken; for during the change of the actors, there muſt be a ſpace of time, during which the ſtage is occupied by neither ſet. It makes indeed a more remarkable interruption, to change the place of action as well as the actors; but that was not practicable upon the Grecian ſtage.

It is hard to ſay upon what model Terence has formed his plays. Having no chorus, there is a pauſe in the repreſentation at the end of every act: but advantage is not taken of the ceſſation, even to vary the place of action; for the ſtreet is alway choſen, where every thing paſſing may be ſeen by every perſon; and by that choice, the moſt ſprightly and intereſting parts of the action, which commonly paſs within doors, are excluded; witneſs the laſt act of the *Eunuch*. He hath ſubmitted to the like ſlavery with reſpect to time. In a word, a play with a regular chorus, is not more confined in place and time than his plays are. Thus a zealous ſectary follows implicitly ancient forms and ceremonies, without once conſidering whether their introductive cauſe be ſtill ſubſiſting. Plautus, of a bolder genius than Terence, makes good uſe of the liberty afforded by an interrupted repreſentation: he varies the place of action upon all occaſions, when the variation ſuits his purpoſe.

Elem. of Criticiſm, ch. 23.

The intelligent reader will by this time underſtand, that we plead for no change of place in our plays but after an interval, nor for any latitude in point of time but what falls in with an interval. The unities of place and time ought to be ſtrictly obſerved during each act; for during the repreſentation, there is no opportunity for the ſmalleſt deviation from either. Hence it is an eſſential requiſite, that during an act the ſtage be always occupied; for even a momentary vacuity makes an interval or interruption. Another rule is no leſs eſſential: it would be a groſs breach of the unity of action, to exhibit upon the ſtage two ſeparate actions at the ſame time; and therefore, to preſerve that unity, it is neceſſary that each perſonage introduced during an act, be linked to thoſe in poſſeſſion of the ſtage, ſo as to join all in one action. Theſe things follow from the very conception of an act, which admits not the ſlighteſt interruption: the moment the repreſentation is intermitted, there is an end of that act; and we have no other notion of a new act, but where, after a pauſe or interval, the repreſentation is again put in motion. French writers, generally ſpeaking, are correct in this particular. The Engliſh, on the contrary, are ſo irregular as ſcarce to deſerve a criticiſm: actors not only ſucceed each other in the ſame place without connection, but, what is ſtill leſs excuſable, they frequently ſucceed each other in different places. This change of place in the ſame act, ought never to be indulged; for, beſide breaking the unity of the act, it has a diſagreeable effect: after an interval, the imagination adapts itſelf to any place that is neceſſary, as readily as at the commencement of the play; but during the repreſentation, we reject change of place. From the foregoing cenſure muſt be excepted the *Mourning Bride* of Congreve, where regularity concurs with the beauty of ſentiment and of language, to make it one of the moſt complete pieces England has to boaſt of. It is to be acknowledged, however, that, in point of regularity, this elegant performance is not altogether unexceptionable. In the four firſt acts, the unities of place and time are ſtrictly obſerved: but in the laſt act, there is a capital error with reſpect to unity of place; for in the three firſt ſcenes of that act, the place of action is a room of ſtate, which is changed to a priſon in the fourth ſcene: the chain alſo of the actors is broken; as the perſons introduced in the priſon, are different from thoſe who made their appearance in the room of ſtate. This remarkable interruption of the repreſentation, makes in effect two acts inſtead of one: and therefore, if it be a rule that a play ought not to conſiſt of more acts than five, this performance is ſo far defective in point of regularity. It may be added, that, even admitting ſix acts, the irregularity would not be altogether removed, without a longer pauſe in the repreſentation than is allowed in the acting; for more than a momentary interruption is requiſite for enabling the imagination readily to fall in with a new place, or with a wide ſpace of time. In *The Way of the World*, of the ſame author, unity of place is preſerved during every act, and a ſtricter unity of time during the whole play than is neceſſary.

§ 4. *Of the Opera.*

51. An opera is a drama repreſented by muſic. This entertainment was invented at Venice. An exhibition of this ſort requires a moſt brilliant magnificence, and an expence truely royal. The drama muſt neceſſarily be compoſed in verſe; for as operas are ſung and accompanied with ſymphonies, they muſt be in verſe to be properly applicable to muſic. To render this entertainment ſtill more brilliant, it is ornamented with dances and ballettes, with ſuperb decorations, and ſurpriſing machinery. The dreſſes of the actors, of thoſe who aſſiſt in the chorus, and of the dancers, being all in the moſt ſplendid and elegant taſte, contribute to render the exhibition highly ſumptuous. But notwithſtanding this union of arts and pleaſures at an immenſe expence, and notwithſtanding a moſt dazzling pageantry, an opera appears, in the eyes of many people of taſte, but as a magnificent abſurdity, ſeeing that nature is never there from the beginning to the end. It is not our buſineſs here, however, to determine between the different taſtes of mankind.

The method of expreſſing our thoughts by ſinging and muſic is ſo little natural, and has ſomething in it ſo forced and affected, that it is not eaſy to conceive how it could come into the minds of men of genius to repreſent any human action, and, what is more, a ſerious or tragic action, any otherwiſe than by ſpeech. We have, it is true, operas in Engliſh by Addiſon, &c. in Italian by Metaſtaſio, in French by M. Quinault, Fontenelle, &c. the ſubjects of which are ſo grave and tragic, that one might call them muſical tragedies, and real *cheſs-d'œuvres* in their kind. But though we are highly ſatisfied and greatly affected on reading them, and are much pleaſed with ſeeing them repreſented, yet the ſpectator is, perhaps, more charmed with the magnificence of the ſight and the beauty of the muſic, then moved with the action and the tragical part of the performance. We are not, however, of that order of critics who ſtrive to prove, that mankind act wrong in finding pleaſure in an object with which they are really pleaſed; who blame a lover for thinking his miſtreſs charming, when her features are by no means regular; and who are perpetually applying the rules of logic to the works of genuis: we make theſe obſervations merely in order to examine if it be not poſſible to augment the pleaſures of a polite people, by making the opera ſomething more natural, more probable, and more conſonant to reaſon.

Bielfield's Elem. of Erudition.

We think, therefore, that the poet ſhould never, or at leaſt very rarely, chooſe a ſubject from hiſtory, but from fable or mythology, or from the regions of enchantment. Every rational mind is conſtantly ſhocked to hear a mutilated hero trill out, from the ſlender pipe of a chaffinch, *To arms! To arms!* and in the ſame tone animate his ſoldiers, and lead them to the aſſault; or harangue an aſſembly of grave ſenators, and ſometimes a whole body of people. Nothing can be more burleſque than ſuch exhibitions; and a man muſt be poſſeſſed of a very uncommon ſenſibility to be affected by them. But as we know not what was the language of the gods, and their manner of expreſſing themſelves, we are at liberty in that caſe to form what illuſions we pleaſe, and to ſuppoſe that they ſung to diſtinguiſh themſelves from mortals. Beſides, all the magic of decorations and machinery become natural, and even neceſſary, in theſe kinds of ſubjects; and therefore readily afford opportunity for all the pomp of theſe performances. The chorus, the dances, the ballettes, the ſymphonies and dreſſes, may likewiſe be all made to correſpond with ſuch ſubjects: nothing is here affected, abſurd, or unnatural. Whoever is poſſeſſed of genius, and is well acquainted with mythology, will there find an inexhauſtible ſource of ſubjects highly diverſified, and quite proper for the drama of an opera.

We ſhall not ſpeak here of that ſort of muſic which appears to us the moſt proper for ſuch a drama, and of the ſeveral alterations of which we think it ſuſceptible, in order to make it more complete, and to adapt it to a more pathetic, more noble, and more natural expreſſion, as well in the recitatives, as in the airs and chorus. We have only here to conſider the buſineſs of the poet. He ſhould never loſe ſight of nature, even in the midſt of the greateſt fiction. A god, a demi-god, a renowned hero, ſuch for example as Renaud in *Armida*, a fairy, a genie, a nymph, or fury, &c. ſhould conſtantly be repreſented according to the characters we give them, and never be made to talk the language of a fop or a *petite maitreſſe*. The recitative, which is the ground-work of the dialogue, requires verſes that are free and not regular, ſuch as with a ſimple cadence approach the neareſt to common language. The airs ſhould not be forced into the piece, nor improperly placed for the ſake of terminating a ſcene, or to diſplay the voice of a performer: they ſhould expreſs ſome ſentiment, or ſome precept, ſhort and ſtriking, or tender and affecting; or ſome ſimile lively and natural; and they ſhoud ariſe of themſelves from a monologue, or from a ſcene between two perſons: prolixity ſhould here be particularly avoided, eſpecially when ſuch an air makes part of a dialogue; for nothing is more inſipid or diſguſtful than the countenances of the other actors who appear at the ſame time, whoſe ſilence is quite unmeaning, and who know not what to do with their hands and feet while the ſinger is ſtraining his throat. The verſe of all the airs ſhould be of the lyric kind, and ſhould contain ſome poetic image, or paint ſome noble paſſion, which may furniſh the compoſer with an opportunity of diſplaying his talents, and of giving a lively and affecting expreſſion to the muſic. A phraſe that is inanimated can never have a good effect in the performance, but muſt become inſipid and horribly tedious in the air. The trite ſimilies of the Italians of a ſtream that flows, or a bird that flies, &c. are no longer ſufferable. The ſame thing may be ſaid with regard to the chorus, which ſhould be equally natural and well adapted: it is here ſometimes a whole people, ſometimes the inhabitants of a peculiar country, and ſometimes warriors, nymphs, or prieſts, &c. who raiſe their voice to demand juſtice, to implore favour, or render a general homage. The action itſelf will furniſh the poet of genius with ideas, words, and the manner of diſpoſing them.

Laſtly, the opera being a performance calculated leſs to ſatisfy the underſtanding, than to charm the ear and affect the heart, and eſpecially to ſtrike the ſight, the poet ſhould have a particular attention to that object, ſhould be ſkilled in the arts of a theatre, ſhould know how to introduce combats, ballettes, feaſts, games, pompous entries, ſolemn proceſſions, and ſuch marvellous incidents as occur in the heavens, upon earth, in the ſea, and even in the infernal regions: but all theſe matters demand a ſtrong character, and the utmoſt preciſion in the execution; for otherwiſe, the comic being a near neighbour to the ſublime, they will eaſily become ridiculous. The unity of action muſt certainly be obſerved in ſuch a poem, and all the incidental epiſodes muſt concur to the principal deſign; otherwiſe it would be a monſtrous chaos. It is impoſſible, however, ſcrupulouſly to obſerve the unity of time and place: though the liberty, which reaſon allows the poet in this reſpect, is not without bounds; and the leſs uſe he makes of it, the more perfect his poem will be. It is not perhaps impoſſible ſo to arrange the objects, that, in changing the decorations, the painter may conſtantly make appear ſome part of the principal decoration which characteriſes the ſituation of the ſcene, as the corner of a palace at the end of a garden, or ſome avenue that leads to it, &c. But all this is liable to difficulties, and even to exceptions; and the art of the painter muſt concur in ſuch caſe with that of the poet. For the reſt, all the operas of Europe are at leaſt one third too long; eſpecially the Italian. The unity of action requires brevity; and ſatiety is inſeparable from a diverſion that laſts full four hours, and ſometimes longer. They have indeed endeavoured to obviate this inconvenience by dividing an opera into three, and even into five acts; but experience proves, that this diviſion, though judicious, is ſtill not ſufficient to relieve the wearied attention.

SECT. II. *Of Lyric Poetry.*

52. THE ode is very ancient, and was probably the firſt ſpecies of poetry. It had its ſource, we may ſuppoſe, from the heart, and was employed to expreſs, with becoming fervour and dignity, the grateful ſenſe man entertained of the bleſſings which daily flowed from God the fountain of all goodneſs: Hence their harveſt hymns, and other devotional compoſitions of that kind.

But in proceſs of time it was employed, not only to praiſe the Almighty for bounties received, but to ſolicit his aid in time of trouble; as is plain from the odes written by king *David* and others, and collected by the *Jewiſh Sanhedrim* into the book of *Pſalms*, to be ſung at their faſts, feſtivals, and on other ſolemn occaſions. Nor was this practice confined to the *Iſraelites* only: Other nations had their ſongs of praiſe and petitions of this ſort, which they preferred to their deities in time of public proſperity and public diſtreſs, as well as to thoſe heroes who diſtinguiſhed themſelves in arms. Even the *American Indians*, whoſe notions of religion are extremely confined, have their war-ſongs, which they ſing to this day.

It is reaſonable to ſuppoſe that the awful purpoſe to which the ode was applied, gave riſe among the ancients to the cuſtom of invoking the muſes; and that the poets, in order to raiſe their ſentiments and language, ſo as to be acceptable to their deities, thought it expedient to ſolicit ſome divine aſſiſtance. Hence poets are ſaid to have been inſpired, and hence an unbounded liberty has been given to the ode; for the lyric poet, fired, as it were, with his ſubject, and borne away on the wings of gratitude, diſdains grammatical niceties and common modes of ſpeech, and often ſoars above rule, though not above reaſon. This freedom, however, conſiſts chiefly in ſudden tranſitions, bold digreſſions, and lofty excurſions. For the ancient poets, and even Pindar, the moſt daring and lofty of them all, has in his ſublimeſt flights, and amidſt all his rapture, preſerved harmony, and often uniformity in his verſification: but ſo great is the variety of his meaſures, that the traces of ſameneſs are in a manner loſt; and this is one of the excellencies for which that poet is admired, and which, though ſeemingly devoid of art, requires ſo much that he has ſeldom been imitated with ſucceſs.

The ancients in their odes indulged ſuch a liberty of fancy, that ſome of their beſt poets not only make bold excurſions and digreſſions, but, having in their flights ſtarted ſome new and noble thought, they frequently purſue it, and never more return to their ſubject. But this looſe kind of ode, which ſeems to reject all method, and in which the poet, having juſt touched upon his ſubject, immediately diverts to another, we ſhould think blameable, were it lawful to call in queſtion the authority of thoſe great men who were our preceptors in this art. We may venture to affirm, however, that theſe compoſitions ſtand in no degree of compariſon with other odes of theirs; in which, after wandering from the ſubject in purſuit of new ideas ariſing from ſome of its adjuncts, and ranging wantonly, as it were, through a variety of matter, the poet is, from ſome other circumſtance, led naturally to his ſubject again; and, like a bee, having collected the eſſence of many different flowers, returns home and unites them all in one uniform pleaſing ſweet.

The ode among the ancients ſignified no more than a ſong: but with the moderns, the ode and the ſong are conſidered as different compoſitions; the ode being uſually employed in grave and lofty ſubjects, and ſeldom ſung but on ſolemn occaſions.

The ſubjects moſt proper for the ode and ſong, Horace has pointed out in a few elegant lines.

Gods, heroes, conquerors, *Olympic* crowns,
Love's pleaſing cares, and the free joys of wine,
Are proper ſubjects for the lyric ſong.

To which we may add, that happineſs, the pleaſures of a rural life, and ſuch parts of morality as afford leſſons for the promotion of our felicity, and reflections on the conduct of life, are equally ſuitable to the ode. This both *Pindar* and *Horace* were ſo ſenſible of, that many of their odes are ſeaſoned with theſe moral ſentences and reflections.

But who can number ev'ry ſandy grain
Waſh'd by *Sicilia*'s hoarſe-reſounding main?
Or who can *Theron*'s gen'rous works expreſs,
And tell how many hearts his bounteous virtues bleſs?
Ode to THERON.

And in another Olympic ode, inſcribed by the ſame poet to Diagoras of Rhodes (and in ſuch eſteem, that it was depoſited in the temple of Minerva, written in letters of gold), Pindar, after exalting them to the ſkies, concludes with this leſſon in life:

Yet as the gales of fortune various blow,
To day tempeſtuous, and to-morrow fair,
Due bounds, ye Rhodians, let your tranſports know;
Perhaps to-morrow comes a ſtorm of care.
Weſt's PINDAR.

The man reſolv'd and ſteady to his truſt,
Inflexible to ill, and obſtinately juſt,
May the rude rabble's inſolence deſpiſe,
Their ſenſeleſs clamours and tumultuous cries;
The tyrant's fierceneſs he beguiles,
And the ſtern brow and the harſh voice defies,
And with ſuperior greatneſs ſmiles.
Not the rough whirlwind, that deforms
Adria's black gulf, and vexes it with ſtorms,
The ſtubborn virtue of his ſoul can move;
Nor the red arm of angry Jove,
That flings the thunder from the ſky,
And gives it rage to roar and ſtrength fly.
Should the whole frame of nature round him break,
In ruin and confuſion hurl'd,
He unconcern'd would hear the mighty crack,
And ſtand ſecure amidſt a falling world.
HORACE.

M. Deſpreaux has given us a very beautiful and juſt deſcription of the ode in theſe lines.

L'Ode avec plus d'éclat, & non moins d'énergie
Elevant juſqu'au ciel ſon vol ambitieux,
Entretient dans vers commerce avec les Dieux.
Aux Athletes dans Piſe elle ouvre la barriere,
Chante un vainqueur poudreux au bout de la carriere;
Mene Achille ſanglant au bords du Simoïs
Ou fait flechir l'Eſcaut ſous le joug de Louis.
Tantôt comme une abeille ardente à ſon ouvrage
Elle s'en va de fleurs dèpouiller le rivage:
Elle peint les feſtins, les danſes & les ris,
Vante un baiſer cueilli ſur les levres d'Iris,
Qui mollement réſiſte & par un doux caprice
Quelquefois le refuſe, afin qu' on le raviſſe.
Son ſtyle impetueux ſouvent marche au haſard.
Chez elle un beau deſordre eſt un effet de l'art,
Loin ces rimeurs craintifs, dont l'eſprit plegmatique
Garde dans ſes fureurs nn ordre didactique:
Qui chantant d'un heros les progrès éclatans,
Maigres hiſtoriens, ſuivront l'ordre des temps.
Apollon de ſon feu leur fut toujours avare, &c.

The lofty ode demands the ſtrongeſt fire,
For there the muſe all Phœbus muſt inſpire:
Mounting to heav'n in her ambitious flight,
Amongſt the Gods and heroes takes delight;
Of Piſa's wreſtlers tells the ſinewy force,
And ſings the duſty conqueror's glorious courſe;

To Simois' banks now fierce Achilles ſends,
Beneath the Gallic yoke now Eſcaut bends:
Sometimes ſhe flies, like an induſtrious bee,
And robs the flow'rs by nature's chemiſtry;
Deſcribes the ſhepherds dances, feaſts, and bliſs,
And boaſts from Phillis to ſurpriſe a kiſs,
When gently ſhe reſiſts with feign'd remorſe,
That what ſhe grants may ſeem to be by force.
Her generous ſtyle will oft at random ſtart
And by a brave diſorder ſhow her art;
Unlike thoſe fearful poets whoſe cold rhyme
In all their raptures keeps exacteſt time,
Who ſing the illuſtrious hero's mighty praiſe,
Dry journaliſts, by terms of weeks and days;
To theſe, Apollo, thrifty of his fire,
Denies a place in the Pierian choir, &c.
SOAMES.

The variety of ſubjects, which are allowed the *lyric* poet, makes it neceſſary to conſider this ſpecies of poetry under the following heads, viz. the *ſublime* ode, the *leſſer* ode, and the *ſong*. We ſhall begin with the loweſt, and proceed to that which is more eminent.

54. I. *Songs* are little poetical compoſitions, uſually ſet to a tune, and frequently ſung in company by way of entertainment and diverſion. Of theſe we have in our language a great number; but, conſidering that number, not many which are excellent; for, as the duke of Buckingham obſerves,

Tho' nothing ſeems more eaſy, yet no part
Of poetry requires a nicer art.

The ſong admits of almoſt any ſubject; but the greateſt part of them turn either upon *love*, *contentment*, or the *pleaſures* of a *country life*, and *drinking*. Be the ſubject, however, what it will, the verſes ſhould be eaſy, natural, and flowing, and contain a certain harmony, ſo that poetry and muſic may be agreeably united. In theſe compoſitions, as in all others, obſcene and profane expreſſions ſhould be carefully avoided, and indeed every thing that tends to take off that reſpect which is due to religion and virtue, and to encourage vice and immorality. As the beſt ſongs in our language are already in every hand, it would ſeem ſuperfluous to inſert examples. For further precepts, however, as well as ſelect examples, in this ſpecies of compoſition, we may refer the reader to the elegant *Eſſay on Song writing*, by Mr Aikin.

55. II. The *leſſer ode*. The diſtinguiſhing character of this is ſweetneſs; and as the pleaſure we receive from this ſort of poem, ariſes principally from its ſoothing and affecting the paſſions, great regard ſhould be paid to the language, as well as to the thoughts and numbers.

The expreſſion ſhould be eaſy, fancy high;
Yet that not ſeem to creep, nor this to fly:
No words tranſpos'd, but in ſuch order all,
As, tho' hard wrought, may ſeem by chance to fall.
D. *Buckingham's Eſſay*.

The ſtyle, indeed, ſhould be eaſy: but it may be alſo florid and figurative. It ſolicits delicacy, but diſdains affectation. The thoughts ſhould be natural, chaſte, and elegant; and the numbers various, ſmooth, and harmonious. A few examples will ſufficiently explain what we mean.

Longinus has preſerved a fragment of *Sappho*, an ancient Greek poeteſs, which is in great reputation amongſt the critics, and has been ſo happily tranſlated by Mr Philips, as to give the Engliſh reader a juſt idea of the ſpirit, eaſe, and elegance of that admired author; and ſhow how exactly ſhe copied nature. To enter into the beauties of this ode, we muſt ſuppoſe a lover ſitting by his miſtreſs, and thus expreſſing his paſſion:

Bleſt as th' immortal gods is he,
The youth who fondly ſits by thee,
And ſees and hears thee all the while
Softly ſpeak, and ſweetly ſmile.
'Twas this depriv'd my ſoul of reſt,
And rais'd ſuch tumults in my breaſt;
For while I gaz'd, in tranſport toſt,
My breath was gone, my voice was loſt.
My boſom glow'd, the ſubtle flame
Ran quick through all my vital frame:
O'er my dim eyes a darkneſs hung;
My ears with hollow murmurs rung.
In dewy damps my limbs were chill'd;
My blood with gentle horrors thrill'd;
My feeble pulſe forgot to play;
I fainted, ſunk, and dy'd away.

After this inſtance of the *Sapphic* ode, it may not be improper to ſpeak of that ſort of ode which is called *Anacreontic*; being written in the manner and taſte of *Anacreon*, a Greek poet, famous for the delicacy of his wit, and the exquiſite, yet eaſy and natural turn of his poeſy. We have ſeveral of his odes ſtill extant, and many modern ones in imitation of him, which are moſtly compoſed in verſes of ſeven ſyllables, or three feet and a half.

We ſhall give the young ſtudent one or two examples of his manner from Mr Fawkes's excellent tranſlation.

The following ode on the power of gold, which had been often attempted with but little ſucceſs, this gentleman has tranſlated very happily.

Love's a pain that works our wo;
Not to love, is painful too:
But, alas! the greateſt pain
Waits the love that meets diſdain.
What avails ingenuous worth,
Sprightly wit, or noble birth?
All theſe virtues uſeleſs prove;
Gold alone engages love.
May he be completely curſt,
Who the ſleeping miſchief firſt
Wak'd to life, and, vile before,
Stamp'd with worth the ſordid ore.
Gold creates in brethren ſtrife;
Gold deſtroys the parent's life;
Gold produces civil jars,
Murders, maſſacres, and wars;
But, the worſt effect of gold,
Love, alas! is bought and ſold.

His ode on the vanity of riches, is of a piece with the above, and conveys a good leſſon to thoſe who are over anxious for wealth.

If the treaſur'd gold could give
Man a longer term to live,

I'd employ my utmoſt care
Still to keep, and ſtill to ſpare;
And, when death approach'd, would ſay,
'Take thy fee, and walk away.'
But ſince riches cannot ſave
Mortals from the gloomy grave,
Why ſhould I myſelf deceive,
Vainly ſigh, and vainly grieve?
Death will ſurely be my lot,
Whether I am rich or not.
Give me freely while I live
Generous wines, in plenty give
Soothing joys my life to cheer,
Beauty kind, and friends ſincere;
Happy! could I ever find
Friends ſincere, and beauty kind.

But two of the moſt admired, and perhaps the moſt imitated, of Anacreon's odes, are that of Mars wounded by one of the darts of Love, and Cupid ſtung by a Bee; both which are wrought up with fancy and delicacy, and are tranſlated with elegance and ſpirit.—Take that of Cupid ſtung by a bee.

Once as Cupid, tir'd with play,
On a bed of roſes lay,
A rude bee, that ſlept unſeen,
The ſweet breathing buds between,
Stung his finger, cruel chance!
With its little pointed lance.
Strait he fills the air with cries,
Weeps, and ſobs, and runs, and flies;
'Till the god to Venus came,
Lovely, laughter-loving dame:
Then he thus began to plain;
"Oh! undone,——I die with pain——
"Dear mamma, a ſerpent ſmall,
"Which a Bee the ploughmen call,
"Imp'd with wings, and arm'd with dart,
"Oh!——has ſtung me to the heart."
Venus thus reply'd, and ſmil'd:
'Dry thoſe tears for ſhame! my child;
'If a bee can wound ſo deep,
'Cauſing Cupid thus to weep,
'Think, O think! what cruel pains
'He that's ſtung by thee ſuſtains.'

Mr Prior, whoſe poetical works will be ever admired for the natural eaſe and elegance of his ſtyle, as well as for the delicacy of his wit, has in ſeveral of his odes the very ſpirit and air of Anacreon. The following ode, in which he deſcribes the effects of love, and inſinuates that the eyes are the beſt interpreters of the heart, is written exactly in his manner.

The merchant, to ſecure his treaſure,
Conveys it in a borrow'd name:
Euphelia ſerves to grace my meaſure;
But Chloe is my real flame.
My ſofteſt verſe, my darling lyre,
Upon Euphelia's toilet lay;
When Chloe noted her deſire,
That I ſhould ſing, that I ſhould play.
My lyre I tune, my voice I raiſe;
But with my numbers mix my ſighs;
And whilſt I ſing Euphelia's praiſe,
I fix my ſoul on Chloe's eyes.
Fair Chloe bluſh'd: Euphelia frown'd:
I ſung and gaz'd; I play'd and trembled:
And Venus, to the Loves around,
Remark'd how ill we all diſſembled.

This ingenious author has given us ſeveral odes in the ſpirit and manner of Horace, as well as of Anacreon; and the following *Anſwer to Chloe jealous*, which was written when he was ſick, has much of the elegant tenderneſs of Sappho.

Yes, faireſt proof of beauty's pow'r,
Dear idol of my panting heart,
Nature points this my fatal hour:
And I have liv'd; and we muſt part.
While now I take my laſt adieu,
Heave thou no ſigh, nor ſhed a tear;
Leſt yet my half-cloſ'd eye may view
On earth an object worth its care.
From jealouſy's tormenting ſtrife
For ever be thy boſom freed;
That nothing may diſturb thy life,
Content I haſten to the dead.
Yet when ſome better-fated youth
Shall with his am'rous parly move thee,
Reflect one moment on his truth
Who, dying, thus perſiſts to love thee.

And in the piece which immediately follows, intitled, *A better Anſwer to Chloe jealous*, he has, together with the gaiety and wit of Anacreon and Horace, blended ſome ſtrokes of humour.

Dear Chloe, how blubber'd is that pretty face?
Thy cheek all on fire, and thy hair all uncurl'd:
Prithee quit this caprice; and (as old Falſtaff ſays)
Let us e'en talk a little like folks of this world.
How canſt thou preſume thou haſt leave to deſtroy
The beauties which Venus but lent to thy keeping?
Thoſe looks were deſign'd to inſpire love and joy:
More ordinary eyes may ſerve people for weeping.
To be vext at a trifle or two that I writ,
Your judgment at once and my paſſion you wrong:
You take that for fact, which will ſcarce be found wit:
Od's life! muſt one ſwear to the truth of a ſong?
What I ſpeak, my fair Chloe, and what I write, ſhows
The diff'rence there is betwixt nature and art:
I court others in verſe; but I love thee in proſe;
And they have my whimſies, but thou haſt my heart.
The god of us verſe-men (you know, child) the Sun,
How after his journeys he ſets up his reſt;
If at morning o'er earth 'tis his fancy to run,
At night he reclines on his Thetis's breaſt.
So when I am weary'd with wand'ring all day,
To thee, my delight, in the evening I come;
No matter what beauties I ſaw in my way,
They were but my viſits, but thou art my home.
Then finiſh, dear Chloe, this paſtoral war,
And let us like Horace and Lydia agree;
For thou art a girl as much brighter than her,
As he was a poet ſublimer than me.

There is much of the ſoftneſs of Sappho, and the ſweetneſs of Anacreon and Prior, in the following ode, which is aſcribed to the late unfortunate Dr Dodd, and was written in compliment to a lady, who, being ſick, had ſent the author a moſs roſe-bud, inſtead of making his family a viſit. This piece is particularly to be eſteemed for the juſt and ſtriking moral with which it is pointed.

The ſlighteſt of favours beſtow'd by the fair,
With rapture we take, and with triumph we wear:
But a moſs-woven roſe-bud, Eliza, from thee,
A well-pleaſing gift to a monarch would be.
—Ah! that illneſs, too cruel, forbidding ſhou'd ſtand,
And refuſe me the gift from thy own lovely hand!
With joy I receive it, with pleaſure will view,
Reminded of thee, by its odour and hue:
"Sweet roſe, let me tell thee, tho' charming thy bloom,
Tho' thy fragrance excels Seba's richeſt perfume;
Thy breath to Eliza's no fragrance hath in't,
And but dull is thy bloom to her cheek's bluſhing tint.
Yet, alas! my fair flow'r, that bloom will decay,
And all thy lov'd beauties ſoon wither away;
Tho' pluck'd by her hand, to whoſe touch, we muſt own,
Harſh and rough is the cygnet's moſt delicate down:"
Thou too, ſnowy hand;—nay, I mean not to preach;
But the roſe, lovely moraliſt, ſuffer to teach.
"Extol not, fair maiden, thy beauties o'er mine;
They too are ſhort-liv'd, and they too muſt decline;
And ſmall, in concluſion, the diff'rence appears,
In the bloom of few days, or the bloom of few years!
But remember a virtue the roſe hath to boaſt,
—Its fragrance remains when its beauties are loſt!"

56. We come now to thoſe odes of the more florid and figurative kind, of which we have many in our language that deſerve particular commendation. Mr Warton's Ode to Fancy has been juſtly admired by the beſt judges; for though it has a diſtant reſemblance of Milton's L'Allegro and Il Penſeroſo, yet the work is original; the thoughts are moſtly new and various, and the language and numbers elegant, expreſſive, and harmonious.

O parent of each lovely muſe,
Thy ſpirit o'er my ſoul diffuſe!
O'er all my artleſs ſongs preſide,
My footſteps to thy temple guide!
To offer at thy turf-built ſhrine
In golden cups no coſtly wine,
No murder'd fatling of the flock,
But flow'rs and honey from the rock.
O nymph, with looſely flowing hair,
With buſkin'd leg, and boſom bare;
Thy waiſt with myrtle-girdle bound,
Thy brows with Indian feathers crown'd;
Waving in thy ſnowy hand
An all-commanding magic wand,
Of pow'r to bid freſh gardens blow
'Mid cheerleſs Lapland's barren ſnow;
Whoſe rapid wings thy flight convey,
Thro' air, and over earth and ſea;
While the vaſt various landſcape lies
Conſpicuous to thy piercing eyes.
O lover of the deſart, hail!
Say, in what deep and pathleſs vale,
Or on what hoary mountain's ſide,
'Midſt falls of water, you reſide;
'Midſt broken rocks, a rugged ſcene,
With green and graſſy dales between;
'Midſt foreſts dark of aged oak,
Ne'er echoing with the woodman's ſtroke;
Where never human art appear'd,
Nor ev'n one ſtraw-roof'd cott was rear'd;
Where Nature ſeems to ſit alone,
Majeſtic on a craggy throne.
Tell me the path, ſweet wand'rer! tell,
To thy unknown ſequeſter'd cell,
Where woodbines cluſter round the door,
Where ſhells and moſs o'erlay the floor;
And on whoſe top an hawthorn blows,
Amid whoſe thickly-woven boughs
Some nightingale ſtill builds her neſt,
Each ev'ning warbling thee to reſt.
Then lay me by the haunted ſtream,
Wrapt in ſome wild, poetic dream;
In converſe while methinks I rove
With Spenſer thro' a fairy grove;
Till ſuddenly awak'd, I hear
Strange whiſper'd muſic in my ear;
And my glad ſoul in bliſs is drown'd,
By the ſweetly-ſoothing ſound!
Me, goddeſs, by the right-hand lead,
Sometimes thro' the yellow mead;
Where Joy and white-rob'd Peace reſort,
And Venus keeps her feſtive court;
Where Mirth and Youth each ev'ning meet,
And lightly trip with nimble feet,
Nodding their lily-crowned heads,
Where Laughter roſe-lip'd Hebe leads;
Where Echo walks ſteep hills among,
Liſt'ning to the ſhepherd's ſong.
Yet not theſe flow'ry fields of joy,
Can long my penſive mind employ;
Haſte, Fancy, from the ſcenes of Folly,
To meet the matron Melancholy!
Goddeſs of the tearful eye,
That loves to fold her arms and ſigh.
Let us with ſilent footſteps go
To charnels, and the houſe of wo;
To Gothic churches, vaults, and tombs,
Where each ſad night ſome virgin comes,
With throbbing breaſt and faded cheek,
Her promis'd bridegroom's urn to ſeek:
Or to ſome abbey's mould'ring tow'rs,
Where, to avoid cold wint'ry ſhow'rs,
The naked beggar ſhivering lies,
While whiſtling tempeſts round her riſe,
And trembles leſt the tott'ring wall
Should on her ſleeping infants fall.
Now let us louder ſtrike the lyre,
For my heart glows with martial fire;
I feel, I feel, with ſudden heat,
My big tumultuous boſom beat;
The trumpet's clangors pierce my ear,
A thouſand widows ſhrieks I hear:
Give me another horſe, I cry;
Lo, the baſe Gallic ſquadrons fly!
Whence is this rage?—what ſpirit, ſay,
To battle hurries me away?
'Tis Fancy, in her fiery car,
Tranſports me to the thickeſt war;
There whirls me o'er the hills of ſlain,
Where tumult and deſtruction reign;

Where, mad with pain, the wounded ſteed,
Tramples the dying and the dead;
Where giant Terror ſtalks around,
With ſullen joy ſurveys the ground,
And, pointing to th' enſanguin'd field,
Shakes his dreadful gorgon ſhield!
O guide me from this horrid ſcene
To high-arch'd walks, and alleys green,
Which lovely Laura ſeeks, to ſhun
The fervors of the mid-day ſun.
The pangs of abſence, O remove,
For thou can'ſt place me near my love;
Can'ſt fold in viſionary bliſs,
And let me think I ſteal a kiſs;
While her ruby lips diſpenſe
Luſcious nectar's quinteſſence!
When young-ey'd Spring profuſely throws
From her green lap the pink and roſe;
When the ſoft turtle of the dale
To Summer tells her tender tale;
When Autumn cooling caverns ſeeks,
And ſtains with wine his jolly cheeks;
When Winter, like poor pilgrim old,
Shakes his ſilver beard with cold;
At ev'ry ſeaſon, let my ear
Thy ſolemn whiſpers, Fancy, hear.
O warm enthuſiaſtic maid!
Without thy pow'rful, vital aid,
That breathes an energy divine,
That gives a ſoul to ev'ry line,
Ne'er may I ſtrive with lips profane,
To utter an unhallow'd ſtrain;
Nor dare to touch the ſacred ſtring,
Save when with ſmiles thou bid'ſt me ſing.
O hear our pray'r, O hither come
From thy lamented Shakeſpeare's tomb,
On which thou lov'ſt to ſit at eve,
Muſing o'er thy darling's grave.
O queen of numbers, once again,
Animate ſome choſen ſwain,
Who, fill'd with unexhauſted fire,
May boldly ſmite the ſounding lyre,
Who with ſome new, unequall'd ſong,
May riſe above the rhyming throng;
O'er all our liſt'ning paſſions reign,
O'erwhelm our ſouls with joy and pain;
With terror ſhake, with pity move,
Rouze with revenge, or melt with love.
O deign t'attend his evening walk,
With him in groves and grottoes talk;
Teach him to ſcorn, with frigid art,
Feebly to touch th' enraptur'd heart;
Like light'ning, let his mighty verſe
The boſom's inmoſt foldings pierce;
With native beauties win applauſe,
Beyond cold critics ſtudied laws:
O let each muſe's fame increaſe,
O bid Britannia rival Greece!

The following ode, written by Mr. Smart on the 5th of December, (being the birth-day of a beautiful young lady), is much to be admired for the variety and harmony of the numbers, as well as for the beauty of the thoughts, and the elegance and delicacy of the complment. It has great fire, and yet great ſweetneſs, and is the happy iſſue of genius and judgement united.

Hail, eldeſt of the monthly train,
  Sire of the winter drear,
December! in whoſe iron reign
  Expires the chequer'd year.
Huſh all the bluſt'ring blaſts that blow,
And proudly plum'd in ſilver ſnow,
  Smile gladly on this bleſt of days;
The livery'd clouds ſhall on thee wait,
And Phœbus ſhine in all his ſtate
  With more than ſummer rays.
Tho' jocund June may juſtly boaſt
  Long days and happy hours;
Tho' Auguſt be Pomona's hoſt,
  And May be crown'd with flow'rs:
Tell June, his fire and crimſon dies,
By Harriot's bluſh, and Harriot's eyes,
  Eclips'd and vanquiſh'd, fade away;
Tell Auguſt, thou canſt let him ſee
A richer, riper fruit than he,
  A ſweeter flow'r than May.

The enſuing ode, written by Mr Collins on the death of Mr Thompſon, is of the paſtoral and elegiac kind, and both picturesque and pathetic. To perceive all the beauties of this little piece, which are indeed many, we muſt ſuppoſe them to have been deliver'd on the river Thames near Richmond.

In yonder grave a Druid lies,
  Where ſlowly winds the ſtealing wave;
The year's beſt ſweets ſhall duteous riſe
  To deck its poet's ſylvan grave!
In yon deep bed of whiſp'ring reeds
  His airy harp * ſhall now be laid,
That he, whoſe heart in ſorrow bleeds,
  May love thro' life the ſoothing ſhade.
Then maids and youths ſhall linger here,
  And, while its ſounds at diſtance ſwell,
Shall ſadly ſeem in pity's ear
  To hear the woodland pilgrim's knell.
Remembrance oft ſhall haunt the ſhore,
  When Thames in ſummer wreaths is dreſt,
And oft ſuſpend the daſhing oar,
  To bid his gentle ſpirit reſt!
And oft as eaſe and health retire
  To breezy lawn, or foreſt deep,
The friend ſhall view yon whitening ſpire †,
  And 'mid the varied landſcape weep.
But thou, who own'ſt that earthy bed,
  Ah! what will ev'ry dirge avail?
Or tears, which love and pity ſhed,
  That mourn beneath the gliding ſail?
Yet lives there one, whoſe heedleſs eye,
  Shall ſcorn thy pale ſhrine glimm'ring near?
With him, ſweet bard, may fancy die,
  And joy deſert the blooming year.
But thou, lorn ſtream, whoſe ſullen tide
  No ſedge-crown'd ſiſters now attend,
Now waft me from the green hill's ſide,
  Whoſe cold turf hides the buried friend.
And ſee, the fairy valleys fade,
  Dim night has veil'd the ſolemn view!
Yet once again, dear parted ſhade,
  Meek nature's child, again adieu!

---

* The harp of Æolus.

† Richmond-church.

Of Lyric Poetry.

The genial meads, aſſign'd to bleſs
  Thy life, ſhall mourn thy early doom;
Their hinds, and ſhepherd girls, ſhall dreſs,
  With ſimple hands thy rural tomb.
Long, long, thy ſtone and pointed clay
  Shall melt the muſing Briton's eyes;
O vales and wild woods, ſhall he ſay,
  In yonder grave your Druid lies!

57. Under this ſpecies of the ode, notice ought to be taken of thoſe written on divine ſubjects, and which are uſually called *hymns*. Of theſe we have many in our language, but none perhaps that are ſo much admired as Mr Addiſon's. The beauties of the following hymn are too well known, and too obvious, to need any commendation; we ſhall only obſerve, therefore, that in this hymn (intended to diſplay the power of the Almighty) he ſeems to have had a pſalm of David in his view, which ſays, that "the heavens declare the glory of God, and the firmament ſheweth his handywork."

  The ſpacious firmament on high,
With all the blue etherial ſky,
And ſpangled heav'ns, a ſhining frame,
Their great original proclaim:
Th' unwearied ſun, from day to day,
Does his Creator's pow'r diſplay,
And publiſhes to ev'ry land
The work of an Almighty hand.
  Soon as the ev'ning ſhades prevail,
The moon takes up the wond'rous tale,
And nightly to the liſt'ning earth
Repeats the ſtory of her birth:
While all the ſtars that round her burn,
And all the planets in their turn,
Confirm the tidings as they roll,
And ſpread the truth from pole to pole.
  What tho' in ſolemn ſilence all
Move round the dark terreſtrial ball?
What tho' nor real voice or ſound
Amid their radiant orb be found?
In reaſon's ear they all rejoice,
And utter forth a glorious voice,
For ever ſinging, as they ſhine,
"The hand that made us is divine."

The following paſtoral hymn is a verſion of the 23d *Pſalm* by Mr *Addiſon;* the peculiar beauties of which have occaſioned many tranſlations; but we have ſeen none that is ſo poetical and perfect as this. And in juſtice to Dr *Boyce*, we muſt obſerve, that the muſic he has adapted to it is ſo ſweet and expreſſive, that we know not which is to be moſt admired, the poet or the muſician.

The Lord my paſture ſhall prepare,
And feed me with a ſhepherd's care;
His preſence ſhall my wants ſupply,
And guard me with a watchful eye;
My noon-day walks he ſhall attend,
And all my midnight hours defend.
When in the ſultry glebe I faint,
Or on the thirſty mountain pant,
To fertile vales and dewy meads,
My weary wand'ring ſteps he leads;
Where peaceful rivers ſoft and ſlow,
Amid the verdant landſkip flow.
Tho' in the paths of death I tread,
With gloomy horrors overſpread,
My ſteadfaſt heart ſhall fear no ill:
For thou, O Lord, art with me ſtill;
Thy friendly crook ſhall give me aid,
And guide me through the dreadful ſhade.
Tho' in a bare and rugged way,
Through devious lonely wilds I ſtray,
Thy bounty ſhall my pains beguile:
The barren wilderneſs ſhall ſmile,
With ſudden greens and herbage crown'd;
And ſtreams ſhall murmur all around.

Of Lyric Poetry.

58. III. We are now to ſpeak of thoſe odes which are of the ſublime and noble kind, and diſtinguiſhed from others by their elevation of thought and diction, as well as by the variety or irregularity of their numbers, as the frequent tranſitions and bold excurſions with which they are enriched.

To give the young ſtudent an idea of the ſudden and frequent tranſitions, digreſſions, and excurſions, which are admitted into the odes of the ancients, we cannot do better than refer him to the celebrated ſong, or ode, of Moſes; which is the oldeſt that we know of, and was penned by that divine author immediately after the children of Iſrael croſſed the Red-Sea.

At the end of this ſong, we are told, that "Miriam the propheteſs, the ſiſter of Aaron, took a timbrel in her hand, and all the women went out after her with timbrels and with dances. And Miriam anſwered them, Sing ye to the Lord, for he hath triumphed glorioufly; the horſe and his rider hath he thrown into the ſea."

From this laſt paſſage it is plain, that the ancients, very early, called in muſic to the aid of poetry; and that their odes were uſually ſung, and accompanied with their lutes, harps, lyres, timbrels, and other inſtruments: nay, ſo eſſential, and in ſuch reputation, was muſic held by the ancients, that we often find in their lyric poets, addreſſes or invocations to the harp, the lute, or the lyre; and it was probably owing to the frequent uſe made of the laſt-mentioned inſtrument with the ode, that this ſpecies of writing obtained the name of *Lyric poetry*.

This ode, or hymn, which ſome believe was compoſed by Moſes in Hebrew verſe, is incomparably better than any thing the heathen poets have produced of the kind, and is by all good judges conſidered as a maſter-piece of ancient eloquence. The thoughts are noble and ſublime: the ſtyle is magnificent and expreſſive: the figures are bold and animated: the tranſitions and excurſions are ſudden and frequent; but they are ſhort, and the poet, having digreſſed for a moment, returns immediately to the great object that excited his wonder, and elevated his ſoul with joy and gratitude. The images fill the mind with their greatneſs, and ſtrike the imagination in a manner not to be expreſſed. It has not indeed the meaſure, cadence, and harmony, which we meet with in ſome of the Greek and Latin poets; but theſe, perhaps, may, in ſome meaſure, have been loſt in the tranſlation.

59. We come now to the *Pindaric ode*, which is (if we except the hymns in the Old Teſtament, and the Pſalms of king David) the moſt exalted part of Lyric

poetry; and was ſo called from Pindar, an ancient Greek poet, who is celebrated for the boldneſs of his flights, the impetuoſity of his ſtyle, and the ſeeming wildneſs and irregularity that runs through his compoſitions, and which are ſaid to be the effect of the greateſt art. (See PINDAR.)

The odes of Pindar were held in ſuch high eſtimation by the ancients, that it was fabled, in honour of their ſweetneſs, that the bees, while he was in the cradle, brought honey to his lips: nor did the victors at the Olympic and other games think the crown a ſufficient reward for their merit, unleſs their atchievements were celebrated in Pindar's ſongs; moſt wiſely preſaging, that the firſt would decay, but the other endure for ever.

This poet did not always write his odes in the ſame meaſure, or with the ſame intention with regard to their being ſung. For the ode inſcribed to *Diagoras*, (the concluding ſtanza of which we inſerted at the beginning of this ſection) is in heroic meaſure, and all the ſtanzas are equal: there are others alſo, as Mr *Weſt* obſerves, made up of *ſtrophes* and *antiſtrophes*, without any *epode;* and ſome compoſed of *ſtrophes* only, of different lengths and meaſures: but the greateſt part of his odes are divided into *ſtrophe*, *antiſtrophe*, and *epode;* in order, as Mr *Congreve* conjectures, to their being ſung, and adreſſed by the performers to different parts of the audience. "They were ſung, ſays he, by a chorus, and adapted to the lyre, and ſometimes to the lyre and pipe. They conſiſted ofteneſt of three ſtanzas. The firſt was called the *ſtrophe*, from the verſion or circular motion of the ſingers in that ſtanza from the right hand to the left. The ſecond ſtanza was called the *antiſtrophe*, from the contraverſion of the chorus; the ſingers in performing that, turning from the left hand to the right, contrary always to their motion in the *ſtrophe*. The third ſtanza was called the *epode*, (it may be as being the after-ſong), which they ſung in the middle, neither turning to one hand nor the other." But Dr *Weſt*'s * friend is of opinion, that the performers alſo danced one way while they were ſinging the *ſtrophe*, and danced back as they ſung the *antiſtrophe*, till they came to the ſame place again, and then ſtanding ſtill they ſung the *epode*. He has tranſlated a paſſage from the *Scholia* on *Hephæſtion*, in proof of his opinion; and obſerves, that the dancing the *ſtrophe* and *antiſtrophe* in the ſame ſpace of ground, and we may ſuppoſe the ſame ſpace of time alſo, ſhows why thoſe two parts conſiſted of the ſame length and meaſure.

* Vid. Pref. to *Weſt's* Pindar.

As the various meaſures of *Pindar's* odes have been the means of ſo far miſleading ſome of our modern poets, as to induce them to call compoſitions *Pindaric* odes, that were not written in the method of *Pindar*, it is neceſſary to be a little more particular on this head, and to give an example from that poet, the more effectually to explain his manner; which we ſhall take from the tranſlation of Dr *Weſt*.

The eleventh NEMEAN ODE.

This ode is inſcribed to *Ariſtagoras*, upon occaſion of his entering on his office of preſident or governor of the iſland of *Tenedos;* ſo that, although it is placed among the *Nemean* odes, it has no ſort of relation to thoſe games, and is indeed properly an inauguration ode, compoſed to be ſung by a chorus at the ſacrifices and the feaſts made by *Ariſtagoras* and his colleagues, in the town-hall, at the time of their being inveſted with the magiſtracy, as is evident from many expreſſions in the firſt *ſtrophe* and *antiſtrophe*.

ARGUMENT.

Pindar opens this ode with an invocation to *Veſta* (the goddeſs who preſided over the courts of juſtice, and whoſe ſtatue and altar were for that reaſon placed in the town-halls, or *Prytanæums*, as the *Greeks* called them), beſeeching her to receive favourably *Ariſtagoras* and his colleagues, who were then coming to offer ſacrifices to her, upon their entering on their office of *Prytans* or magiſtrates of *Tenedos;* which office continuing for a-year, he begs the goddeſs to take *Ariſtagoras* under her protection during that time, and to conduct him to the end of it without trouble or diſgrace. From *Ariſtagoras*, *Pindar* turns himſelf in the next place to his father *Arceſilas*, whom he pronounces happy, as well upon account of his ſon's merit and honour, as upon his own great endowments and good fortune; ſuch as beauty, ſtrength, courage, riches, and glory reſulting from his many victories in the games. But leſt he ſhould be too much puffed up with theſe praiſes, he reminds him at the ſame time of his mortality, and tells him that his cloathing of fleſh is periſhable, that he muſt e'er long be cloathed with earth, the *end of all things:* and yet, continues he, it is but juſtice to praiſe and celebrate the worthy and deſerving, who from good citizens ought to receive all kinds of honour and commendation; as *Ariſtagoras*, for inſtance, who hath rendered both himſelf and his country illuſtrious by the many victories he hath obtained, to the number of ſixteen, over the neighbouring youth, in the games exhibited in and about his own country. From whence, ſays the poet, I conclude he would have come off victorious even in the *Pythian* and *Olymic* games, had he not been reſtrained from engaging in thoſe famous liſts by the too timid and cautious love of his parents. Upon which he falls into a moral reflection upon the vanity of man's hopes and fears; by the former of which they are oftentimes excited to attempts beyond their ſtrength, which accordingly iſſue in their diſgrace; as, on the other hand, they are frequently reſtrained, by unreaſonable and ill-grounded fears, from enterprizes, in which they would in all probability have come off with honour. This reflection he applies to *Ariſtagoras*, by ſaying it was very eaſy to foreſee what ſucceſs he was like to meet with, who both by father and mother was deſcended from a long train of great and valiant men. But here again, with a very artful turn of flattery to his father *Arceſilas*, whom he had before repreſented as ſtrong and valiant, and famous for his victories in the games, he obſerves that every generation, even of a great and glorious family, is not equally illuſtrious, any more than the fields and trees are every year equally fruitful; that the gods had not given mortals any certain tokens, by which they might foreknow when the *rich years of virtue ſhould ſucceed;* whence it comes to paſs, that men out of ſelf-conceit and preſumption, are perpetually laying ſchemes, and forming enterprizes, without previouſly conſulting prudence or wiſdom, whoſe *ſtreams*, ſays he, lie remote and out of the common road. From all which he infers, that it is better to moderate our deſires, and ſet bounds to our avarice and ambition; with which moral precept he concludes the ode.

STROPHE I.

Daughter of Rhea! thou, whoſe holy fire
Before the awful ſeat of juſtice flames!
Siſter of heav'n's almighty ſire!
Siſter of Juno, who co-equal claims
With Jove to ſhare the empire of the Gods!
O virgin Veſta! to thy dread abodes,
Lo! Ariſtagoras directs his pace!
Receive and near thy ſacred ſceptre place
Him, and his colleagues, who, with honeſt zeal,
O'er Tenedos preſide, and guard the public weal.

ANTISTROPHE I.

And lo! with frequent off'rings, they adore
Thee *, firſt invok'd in ev'ry ſolemn pray'r!
To thee unmix'd libations pour,
And fill with od'rous fumes the fragrant air.
Around in feſtive ſongs the hymning choir
Mix the melodious voice and ſounding lyre,
While ſtill, prolong'd with hoſpitable love,
Are ſolemniz'd the rites of genial Jove:
Then guard him, Veſta, through his long career,
And let him cloſe in joy his miniſterial year.

EPODE I.

But hail, Arceſilas! all hail
To thee, bleſs'd father of a ſon ſo great!
Thou whom on fortune's higheſt ſcale
The favourable hand of heav'n hath ſet,
Thy manly form with beauty hath refin'd,
And match'd that beauty with a valiant mind.
Yet let not man too much preſume,
Tho' grac'd with beauty's faireſt bloom;
Tho' for ſuperior ſtrength renown'd;
Tho' with triumphal chaplets crown'd:
Let him remember, that, in fleſh array'd,
Soon ſhall he ſee that mortal veſtment fade;
Till loſt, impriſon'd in the mould'ring urn,
To earth, the end of all things, he return.

STROPHE II.

Yet ſhould the worthy from the public tongue
Receive their recompence of virtuous praiſe;
By ev'ry zealous patriot ſung,
And deck'd with ev'ry flow'r of heav'nly lays.
Such retribution in return for fame,
Such, Ariſtagoras, thy virtues claim,
Claim from thy country; on whoſe glorious brows
The wreſtler's chaplet ſtill unfaded blows;
Mix'd with the great Pancratiaſtic crown,
Which from the neighb'ring youth thy early valour won.

ANTISTROPHE II.

And (but his timid parents' cautious love,
Diſturbing ever his too forward hand,
Forbad their tender ſon to prove
The toils of Pythia' or Olympia's ſands),
Now by the Gods I ſwear, his valorous might
Had 'ſcap'd victorious in each bloody fight;
And from * Caſtalia, or where dark with ſhade
The mount † of Saturn rears its olive head,
Great and illuſtrious home had he return'd;
While, by his fame eclips'd, his vanquiſh'd foes had mourn'd.

EPODE II.

Then, his triumphal treſſes bound
With the dark verdure of th' Olympic grove,
With joyous banquets had he crown'd
The great quinquennial feſtival of Jove;
And cheer'd the ſolemn pomp with choral lays,
Sweet tribute, which the muſe to virtue pays.
But, ſuch is man's prepoſt'rous fate!
Now, with o'er-weening pride elate,
Too far he aims his ſhaft to throw,
And ſtraining burſts his feeble bow:
Now puſillanimous depreſs'd with fear,
He checks his virtue in the mid-career;
And of his ſtrength diſtruſtful, coward flies
The conteſt, tho' empow'r'd to gain the prize.

STROPHE III.

But who could err in propheſying good
Of him, whoſe undegenerating breaſt
Swells with a tide of Spartan blood,
From ſire to ſire in long ſucceſſion trac'd
Up to Piſander; who in days of yore
From old Amyclæ to the Leſbian ſhore
And Tenedos, colleagu'd in high command
With great Oreſtes, led th' Æolian band?
Nor was his mother's race leſs ſtrong and brave,
Sprung from a ſtock that grew on fair † Iſmenus' wave.

ANTISTROPHE III.

Tho' for long intervals obſcur'd, again
Oft-times the ſeeds of lineal worth appear.
For neither can the furrow'd plain
Full harveſts yield with each returning year;
Nor in each period will the pregnant bloom
Inveſt the ſmiling tree with rich perfume.
So, barren often and inglorious paſs
The generations of a noble race;
While nature's vigour, working at the root,
In after-ages ſwells, and bloſſoms into fruit.

EPODE III.

Nor hath Jove giv'n us to foreknow
When the rich years of virtue ſhall ſucceed:
Yet bold and daring on we go,
Contriving ſchemes of many a mighty deed;
While hope, fond inmate of the human mind,
And ſelf-opinion, active, raſh, and blind,
Hold up a falſe illuſive ray,
That leads our dazzled feet aſtray
Far from the ſprings, where, calm and ſlow,
The ſecret ſtreams of wiſdom flow.
Hence ſhould we learn our ardour to reſtrain:
And limit to due bounds the thirſt of gain.
To rage and madneſs oft that paſſion turns,
Which with forbidden flames deſpairing burns.

60. From the above ſpecimen, and from what we have already ſaid on this ſubject, the reader will perceive, that odes of this ſort are diſtinguiſhed by the happy tranſitions and digreſſions which they admit, and the ſurpriſing yet natural returns to the ſubject. This requires great judgment and genius; and the poet

---

* It was uſual in all ſolemn ſacrifices and prayers to begin with invoking Veſta.

* A river, upon whoſe banks the Pythian games were exhibited.

† A ſmall hill planted with olives, that overlooked the Stadium at Olympia.

† Iſmenus was a river of Bœotia, of which country was Menalippus, the anceſtor of Ariſtagoras by the mother's ſide.

poet who would excel in this kind of writing, ſhould draw the plan of his poem, in manner of the argument we have above inſerted, and mark out the places where thoſe elegant and beautiful ſallies and wanderings may be made, and where the returns will be eaſy and proper.

Pindar, it is univerſally allowed, had a poetical and fertile imagination, a warm and enthuſiaſtic genius, a bold and figurative expreſſion, and a conciſe and ſententious ſtyle: but it is generally ſuppoſed that many of thoſe pieces which procured him ſuch extravagant praiſes and extraordinary teſtimonies of eſteem from the ancients, are loſt; and if they were not, it would be perhaps impoſſible to convey them into our language; for beauties of this kind, like plants of an odoriferous and delicate nature, are not to be tranſplanted into another clime without loſing much of their fragrance, or eſſential quality.

61. With regard to thoſe compoſitions which are uſually called *Pindaric odes*, (but which ought rather to be diſtinguiſhed by the name of *irregular odes*), we have many in our language that deſerve particular commendation: and the criticiſm Mr Congreve has given us on that ſubject, has too much aſperity, and too great latitude; for if other writers have, by miſtaking Pindar's meaſures, given their odes an improper title, it is a crime, one would think, not ſo dangerous to the commonwealth of letters, as to deſerve ſuch ſevere reproof. Beſide which, we may ſuppoſe that ſome of theſe writers did not deviate from Pindar's method through ignorance, but by choice; and that as their odes were not to be performed with both ſinging and dancing, in the manner of Pindar's, it ſeemed unneceſſary to confine the firſt and ſecond ſtanzas to the ſame exact numbers as was done in his ſtrophes and antiſtrophes. The poet therefore had a right to indulge himſelf with more liberty; and we cannot help thinking, that the ode which Mr Dryden has given us, intitled, *Alexander's Feaſt*, or *the Power of Muſic*, is altogether as valuable in his looſe and wild numbers, as it could have been if the ſtanzas were more regular, and written in the manner of Pindar. In this ode there is a wonderful ſublimity of thought, a loftineſs and ſweetneſs of expreſſion, and a moſt pleaſing variety of numbers.

'Twas at the royal feaſt, for Perſia won
By Philip's warlike ſon,
Aloft, in awful ſtate,
The god-like hero ſate
On his imperial throne:
His valiant peers were plac'd around;
Their brows with roſes and with myrtles bound,
(So ſhould deſert in arms be crown'd:)
The lovely Thais by his ſide
Sat like a blooming eaſtern bride,
In flow'r of youth and beauty's pride.
Happy, happy, happy pair!
None but the brave,
None but the brave,
None but the brave,
None but the brave deſerve the fair.
Chor. *Happy, happy*, &c.
Timotheus, plac'd on high
Amid the tuneful quire,
With flying fingers touch'd the lyre:
The trembling notes aſcend the ſky,
And heav'nly joys inſpire.
The ſong began from Jove,
Who left his bliſful ſeats above,
(Such is the pow'r of mighty love!)
A dragon's fiery form bely'd the God:
Sublime on radiant ſpheres he rode,
When he to fair Olympia preſs'd;
And while he ſought her ſnowy breaſt:
Then round her ſlender waiſt he curl'd,
And ſtamp'd an image of himſelf, a ſov'reign of the world.
The liſt'ning crowd admire the lofty ſound.
A preſent deity, they ſhout around;
A preſent deity, the vaulted roofs rebound:
With raviſh'd ears
The monarch hears,
Aſſumes the God,
Affects to nod,
And ſeems to ſhake the ſpheres.
Chor. *With raviſh'd ears*, &c.
The praiſe of Bacchus then the ſweet muſician ſung;
Of Bacchus ever fair and ever young:
The jolly God in triumph comes;
Sound the trumpets, beat the drums:
Fluſh'd with a purple grace,
He ſhows his honeſt face:
Now give the hautboys breath; he comes, he comes!
Bacchus, ever fair and young,
Drinking joys did firſt ordain:
Bacchus' bleſſings are a treaſure,
Drinking is the ſoldier's pleaſure:
Rich the treaſure,
Sweet the pleaſure:
Sweet is pleaſure after pain.
Chor. *Bacchus' bleſſings*, &c.
Sooth'd with the ſound, the king grew vain,
Fought all his battles o'er again;
And thrice he routed all his foes, and thrice he ſlew the ſlain.
The maſter ſaw the madneſs riſe;
His glowing cheeks, his ardent eyes;
And while he heav'n and earth defy'd,
Chang'd his hand, and check'd his pride.
He choſe a mournful muſe
Soft pity to infuſe:
He ſung Darius great and good,
By too ſevere a fate,
Fallen, fallen, fallen, fallen,
Fallen from his high eſtate,
And welt'ring in his blood;
Deſerted at his utmoſt need,
By thoſe his former bounty fed,
On the bare earth expos'd he lies,
With not a friend to cloſe his eyes.
With down-caſt looks the joyleſs victor ſat,
Revolving in his alter'd ſoul
The various turns of chance below;
And now and then a ſigh he ſtole,
And tears began to flow.
Chor. *Revolving*, &c.
The mighty maſter ſmil'd, to ſee
That love was in the next degree:
'Twas but a kindred ſound to move;

For pity melts the mind to love.
Softly ſweet, in Lydian meaſures:
Soon he ſooth'd his ſoul to pleaſures.
War, he ſung, is toil and trouble;
Honour but an empty bubble,
Never ending, ſtill beginning,
Fighting ſtill, and ſtill deſtroying.
If the world be worth thy winning,
Think, O think, it worth enjoying.
Lovely Thais ſits beſide thee,
Take the good the gods provide thee.
The many rend the ſkies with loud applauſe;
So love was crown'd, but muſic won the cauſe.
The prince, unable to conceal his pain,
Gaz'd on the fair,
Who cauſ'd his care,
And ſigh'd and look'd, ſigh'd and look'd,
Sigh'd and look'd, and ſigh'd again:
At length with love and wine at once oppreſs'd,
The vanquiſh'd victor ſunk upon her breaſt.
Chor. *The prince*, &c.
Now ſtrike the golden lyre again;
A louder yet, and yet a louder ſtrain.
Break his bands of ſleep aſunder,
And rouſe him, like a rattling peal of thunder.
Hark! hark! the horrid ſound
Has rais'd up his head,
As awak'd from the dead,
And amaz'd he ſtares round.
Revenge, revenge, Timotheus cries,
See the furies ariſe:
See the ſnakes that they rear,
How they hiſs in their hair,
And the ſparkles that flaſh from their eyes;
Behold a ghaſtly band,
Each a torch in his hand!
Thoſe are Grecian, that in battle were ſlain,
And unbury'd remain,
Inglorious on the plain.
Give the vengeance due
To the valiant crew.
Behold how they toſs their torches on high,
How they point to the Perſian abodes.
And glitt'ring temples of their hoſtile gods.
The princes applaud, with a furious joy;
And the king ſeiz'd a flambeau, with zeal to deſtroy;
Thais led the way
To light him to his prey,
And, like another Helen, fir'd another Troy.
Chor. *And the king ſeiz'd*, &c.
Thus long ago,
While organs yet were mute;
Timotheus, to his breathing flute,
And ſounding lyre,
Could ſwell the ſoul to rage, or kindle ſoft deſire.
At laſt divine Cecilia came,
Inventreſs of the vocal frame;
The ſweet enthuſiaſt, from her ſacred ſtore,
Enlarg'd the former narrow bounds,
And added length to ſolemn ſounds,
With nature's mother-wit, and arts unknown before.
Let old Timotheus yield the prize,
Or both divide the crown;
He rais'd a mortal to the ſkies;
She drew an angel down.
Grand chor. *At laſt*, &c.

As Mr Pope has employ'd his maſterly pen upon the ſame ſubject, it would be doing him a ſort of injuſtice not to let him appear with Mr Dryden. Each of theſe odes, we may venture to ſay, is written with a ſpirit of poetry peculiar to the great genius of their reſpective authors; but which of them has ſucceeded beſt, let the critics determine.

Deſcend, ye Nine! deſcend and ſing;
The breathing inſtruments inſpire,
Wake into voice each ſilent ſtring,
And ſweep the ſounding lyre!
In a ſadly-pleaſing ſtrain
Let the warbling lute complain:
Let the loud trumpet ſound,
Till the roofs all around
The ſhrill echoes rebound:
While, in more length'n'd notes and ſlow,
The deep, majeſtic, ſolemn organs blow.
Hark! the numbers ſoft and clear
Gently ſteal upon the ear;
Now louder, and yet louder riſe,
And fill with ſpreading ſounds the ſkies:
Exulting in triumph now ſwell the bold notes,
In broken air, trembling, the wild muſic floats;
Till, by degrees, remote and ſmall,
The ſtrains decay,
And melt away
In a dying, dying fall.
By muſic minds an equal temper know,
Nor ſwell too high, nor ſink too low.
If in the breaſt tumultuous joys ariſe,
Muſic her ſoft aſſuaſive voice applies;
Or when the ſoul is preſs'd with cares,
Exalts her in enliv'ning airs.
Warriors ſhe fires with animated ſounds,
Pours balm into the bleeding lover's wounds:
Melancholy lifts her head,
Morpheus rouſes from his bed,
Sloth unfolds her arms and wakes,
Liſt'ning Envy drops her ſnakes;
Inteſtine war no more our paſſions wage,
And giddy factions hear away their rage.
But when our country's cauſe provokes to arms,
How martial muſic ev'ry boſom warms!
So when the firſt bold veſſel dar'd the ſeas,
High on the ſtern the Thracian rais'd his ſtrain,
While Argo ſaw her kindred trees
Deſcend from Pelion to the main.
Tranſported Demi-gods ſtood round,
And men grew heroes at the ſound,
Enflam'd with glory's charms:
Each chief his ſevenfold ſhield diſplay'd,
And half unſheath'd the ſhining blade;
And ſeas, and rocks, and ſkies rebound,
To arms, to arms, to arms!
But when through all th' infernal bounds
Which flaming Phlegeton ſurrounds,
Love, ſtrong as death the poet led
To the pale nations of the dead,
What ſounds were heard,
What ſcenes appear'd
O'er all the dreary coaſts!
Dreadful gleams,
Diſmal ſcreams,
Fires that glow,

Shrieks of wo,
Sullen moans,
Hollow groans,
And cries of tortur'd ghoſts!
But hark! he ſtrikes the golden lyre,
And ſee, the tortur'd ghoſts reſpire!
See ſhady forms advance!
Thy ſtone, O Siſyphus, ſtands ſtill,
Ixion reſts upon his wheel,
And the pale ſpectres dance!
The Furies ſink upon their iron beds,
And ſnakes uncurl'd hang liſtning round their heads.
By the ſtreams that ever flow,
By the fragrant winds that blow
O'er the Elyſian flow'rs;
By thoſe happy ſouls who dwell
In yellow meads of aſphodel,
Or amaranthine bow'rs;
By the heroes armed ſhades,
Glitt'ring thro' the gloomy glades;
By the youths who died for love,
Wand'ring in the myrtle grove;
Reſtore, reſtore, Euridyce to life:
Oh take the huſband, or return the wife!
He ſung, and hell conſented
To hear the poet's pray'r;
Stern Proſerpine relented,
And gave him back the fair.
Thus ſong could prevail
O'er death and o'er hell,
A conqueſt how hard and how glorious!
Tho' fate had faſt bound her
With Styx nine times round her,
Yet muſic and love were victorious.
But ſoon, too ſoon, the lover turns his eyes:
Again ſhe falls, again ſhe dies, ſhe dies!
How wilt thou now the fatal ſiſters move?
No crime was thine, if 'tis no crime to love,
Now under hanging mountains,
Beſide the fall of fountains,
Or where Hebrus wanders,
Rolling in mæanders,
All alone
Unheard, unknown,
He makes his moan;
And calls her ghoſt,
For ever, ever, ever loſt!
Now with furies ſurrounded,
Deſpairing, confounded,
He trembles, he glows
Amidſt Rhodope's ſnows:
See, wild as the winds, o'er the deſart he flies!
Hark! Hæmus reſounds with the Bacchanals cries
——Ah ſee, he dies!
Yet even in death Eurydice he ſung,
Eurydice ſtill trembled on his tongue;
Eurydice the woods,
Eurydice the floods,
Eurydice the rocks and hollow mountains rung.
Muſic the fierceſt grief can charm,
And fate's ſevereſt rage diſarm:
Muſic can ſoften pain to eaſe,
And make deſpair and madneſs pleaſe:
Our joys below it can improve,
And antedate the bliſs above.
This the divine CECILIA found,
And to her Maker's praiſe confin'd the ſound.
When the full organ joins the tuneful quire,
Th' immortal pow'rs incline their ear;
Borne on the ſwelling notes our ſouls aſpire,
While ſolemn airs improve the ſacred fire,
And angels lean from heav'n to hear.
Of Orpheus now no more let poets tell,
To bright Cecilia greater pow'r is giv'n:
His numbers rais'd a ſhade from hell,
Her's lift the ſoul to heav'n.

The following imitation of the 9th ode of the firſt book of Horace, by Mr Congreve, is of the irregular kind; and has been much admir'd, as well for the beautiful deſcription of the winter, as for his moral reflections.

Bleſs me, 'tis cold! how chill the air!
How naked does the world appear!
But ſee (big with the offspring of the north)
The teaming clouds bring forth:
A ſhow'r of ſoft and fleecy rain
Falls to new-clothe the earth again.
Behold the mountain-tops, around,
As if with fur of ermins crown'd:
And lo! how by degrees
The univerſal mantle hides the trees
In hoary flakes, which downward fly,
As if it were the autumn of the ſky;
Trembling the groves ſuſtain the weight, and bow
Like aged Limbs, which feebly go
Beneath a venerable head of ſnow.
Diffuſive cold does the whole earth invade;
Like a diſeaſe, thro' all its veins 'tis ſpread,
And each late living ſtream is numb'd and dead.
Let's melt the frozen hours, make warm the air;
Let cheerful fires Sol's feeble beams repair:
Fill the large bowl with ſparkling wine;
Let's drink, 'till our own faces ſhine,
'Till we like ſuns appear,
To light and warm the hemiſphere.
Wine can diſpenſe to all both light and heat,
They are with wine incorporate:
That pow'rful juice, with which no cold dares mix,
Which ſtill is fluid, and no froſt can fix;
Let that but in abundance flow,
And let it ſtorm and thunder, hail and ſnow,
'Tis heav'n's concern; and let it be
The care of heaven ſtill, for me.
Thoſe winds, which rend the oaks and plough the ſea,
Great Jove can, if he pleaſe,
With one commanding nod appeaſe.
Seek not to know to-morrow's doom;
That is not ours, which is to come.
The preſent moment's all our ſtore;
The next ſhould heav'n allow,
Then this will be no more:
So all our Life is but one inſtant *now*.
Look on each day you've paſt
To be a mighty treaſure won:
And lay each moment out in haſte;
We're ſure to live too faſt,
And cannot live too ſoon.
Youth does a thouſand pleaſures bring
Which from decrepid age will fly;

The flowers that flouriſh in the ſpring,
In winter's cold embraces die.
Now Love, that everlaſting *Boy*, invites
To revel, while you may, in ſoft delights.
Now the kind nymph yields all her charms,
Nor yields in vain to youthful arms:
Slowly ſhe promiſes at night to meet;
But eagerly prevents the hour with ſwifter feet;
To gloomy groves and ſhades obſcure ſhe flies,
There veils the bright confeſſion of her eyes.
Unwilling ſhe ſtays,
Would more unwillingly depart,
And in ſoft ſighs conveys
The whiſpers of her heart.
Still ſhe invites, and ſtill denies,
And vows ſhe'll leave you if y'are rude;
Then from her raviſher ſhe flies,
But flies to be purſu'd:
If from his ſight ſhe does herſelf convey,
With a feign'd laugh ſhe will herſelf betray,
And cunningly inſtruct him in the way.

Mr Maſon's ode on *Conſtancy*, which is alſo of the irregular kind, ſhows that theſe ſort of odes are well adapted to ſubjects of an elevated and ſublime nature, where much imagery is introduced.

Whence does this ſudden luſtre riſe,
That gilds the grove? Not like the noon-tide beam
Which ſparkling dances on the trembling ſtream,
Nor the blue lightning's flaſh ſwift-ſhooting thro' the ſkies;
But ſuch a ſolemn ſteady light,
As o'er the cloudleſs azure ſteals,
When CYNTHIA, riding on the brow of night,
Stops in their mid career her ſilver wheels.
Whence can it riſe, but from the ſober pow'r
Of CONSTANCY? ſhe, heaven-born queen,
Deſcends, and in this (A) woobine-veſted bower
Fixes her ſtedfaſt reign:
Stedfaſt as when her high command
Gives to the ſtarry band
Their radiant ſtations in heav'n's ample plain:
Stedfaſt, as when around this nether ſphere
She winds the purple year:
Tells what time the ſnow-drop cold
Its maiden whiteneſs may unfold,
When the golden harveſt bend;
Then bids pale Winter wake to pour
The pearly hail's tranſlucent ſhow'r,
When the ruddy fruits deſcend,
To caſt his ſilv'ry mantle o'er the woods,
And bind in cryſtal chains the ſlumb'ring floods.
The ſoul, which ſhe inſpires, has pow'r to climb
To all the heights ſublime
Of virtue's tow'ring hill.
That hill, at whoſe low foot weak warbling ſtrays
The ſcanty ſtream of human praiſe,
A ſhallow trickling rill.
While on the ſummits hov'ring angels ſhed
From their bleſt pinions the nectarious dews
Of rich immortal fame: from theſe the muſe
Oft ſteals ſome precious drops, and blends with art
With thoſe the lower ſtreams impart;
Then ſhow'rs it all on ſome high-favour'd head.
But thou, ELFRIDA, claim'ſt the genuine dew;
Thy worth demands it all,
Pure and unmixt on thee the ſacred drops ſhall fall.

We ſhall conclude this ſection, and theſe examples, with Dr Akenſide's ode on the ſubject we have been treating of. In this piece, which is an original of the kind, the meaſures are varied in imitation of thoſe ancients who have excelled in *lyric poetry*.

Once more I join the Theſpian quire,
And taſte th' inſpiring fount again.
O parent of the Grecian lyre,
Admit me to thy ſacred ſtrain—
And lo! with eaſe my ſtep invades
The pathleſs vale and opening ſhades,
'Till now I ſpy her verdant ſeat;
And now at large I drink the ſound,
While theſe her offſpring, liſt'ning round,
By turns her melody repeat.
I ſee Anacreon ſmile and ſing,
His ſilver treſſes breathe perfume;
His cheek diſplays a ſecond ſpring
Of roſes, taught by wine to bloom.
Away, deceitful cares, away!
And let me liſten to his lay,
While flow'ry dreams my ſoul employ;
While turtle-wing'd the laughing Hours,
Lead hand in hand the feſtal pow'rs,
Lead Youth and Love, and harmleſs Joy.
Broke from the fetters of his native land,
Devoting ſhame and vengeance to her lords,
With louder impulſe, and a threat'ning hand,
The Leſbian (B) patriot ſmites the ſounding chords:
Ye wretches, ye perfidious train,
Ye curſt of gods and free-born men,
Ye murd'rers of the laws,
Though now you glory in your luſt,
Though now you tread the feeble neck in duſt,
Yet time and righteous *Jove* will judge your dreadful cauſe.
But lo, to Sappho's mournful airs
Deſcends the radiant queen of love;
She ſmiles, and aſks what fonder cares
Her ſuppliant's plaintive meaſures move:
Why is my faithful maid diſtreſt?
Who, Sappho, wounds thy tender breaſt?
Say, flies he?—ſoon he ſhall purſue:
Shuns he thy gifts?—he too ſhall give:
Slights he thy ſorrows?—he ſhall grieve,
And bend him to thy haughty vow.
But, O Melpomene, for whom
Awakes thy golden ſhell again?
What mortal breath ſhall e'er preſume
To echo that unbounded ſtrain?
Majeſtic in the frown of years,
Behold the man † of Thebes appears:
For ſome there are, whoſe mighty frame

† Pindar.

To

(A) In which Ethelwold and Elfrida had been juſt exchanging profeſſions of their mutual fidelity.

(B) Alcæus of Mitylene, the capital of Leſbos, who fled from his native city to eſcape the operation of thoſe who had inſlaved it, and wrote againſt them in his exile thoſe noble invectives which are much applauded by the ancient critics.

The hand of Jove at birth endow'd
With hopes that mock the gazing crowd;
As eagles drink the noontide flame,
While the dim raven beats his weary wings,
And clamours far below.—Propitious muſe,
While I ſo late unlock thy hallow'd ſprings,
And breathe whate'er thy ancient airs infuſe,
To poliſh Albion's warlike ear
This long-loſt melody to hear,
Thy ſweeteſt arts employ;
As when the winds from ſhore to ſhore,
Thro' Greece thy lyre's perſuaſive language bore,
Till towns, and iſles, and ſeas return'd the vocal joy.
But oft amid the Græcian throng,
The looſe-rob'd forms of wild deſire
With lawleſs notes intun'd thy ſong,
To ſhameful ſteps diſſolv'd thy quire.
O fair, O chaſte, be ſtill with me,
From ſuch profaner diſcord free:
While I frequent thy tuneful ſhade,
No frantic ſhouts of Thracian dames,
No ſatyrs fierce with ſavage flames,
Thy pleaſing accents ſhall invade.
Queen of the lyre, in thy retreat,
The faireſt flow'rs of Pindus glow;
The vine aſpires to crown thy ſeat,
And myrtles round thy laurel grow.
Thy ſtrings attune their varied ſtrain,
To every pleaſure, every pain,
Which mortal tribes were born to prove;
And ſtrait our paſſions riſe or fall,
As, at the winds imperious call,
The ocean ſwells, the billows move.
When midnight liſtens o'er the ſlumb'ring earth,
Let me, O muſe, thy ſolemn whiſpers hear:
When morning ſends her fragrant breezes forth,
With airy murmurs touch my opening ear.
And ever watchful at thy ſide,
Let wiſdom's awful ſuffrage guide
The tenor of thy lay:
To her of old by Jove was giv'n
To judge the various deeds of earth and heav'n;
'Twas thine by gentle arts to win us to her ſway.
Oft as from ſtricter hours reſign'd,
I quit the maze where ſcience toils,
Do thou refreſh my yielding mind
With all thy gay, deluſive ſpoils.
But, O indulgent, come not nigh
The buſy ſteps, the jealous eye,
Of gainful Care and wealthy Age,
Whoſe barren ſouls thy joys diſdain,
And hold as foes to reaſon's reign
Whome'er thy lovely haunts engage.
With me, when Mirth's conſenting band,
Around fair Friendſhip's genial board,
Invite the heart-awakening hand,
With me ſalute the Teian chord.
Or if invok'd at ſofter hours,
O ſeek with me the happy bow'rs
That hear Dione's gentle tongue;
To beauty link'd with virtue's train,
To love devoid of jealous pain,
There let the ſapphic lute be ſtrung.
But when from envy, and from death, to claim
A hero bleeding for his native land;
Or, when to nouriſh freedom's veſtal flame,
I hear my genius utter his command;
Nor Theban voice, nor Leſbian lyre
From thee, O muſe, do I require,
While my prophetic mind,
Conſcious of pow'rs ſhe never knew,
Aſtoniſh'd, graſps at things beyond her view,
Nor by another's fate hath felt herſelf confin'd.

Sect. III. *Of the Elegy.*

62. The *Elegy* is a *mournful* and *plaintive*, but yet ſweet and engaging kind of poem. It was firſt invented to bewail the death of a friend; and afterwards uſed to expreſs the complaints of lovers, or any other melancholy ſubject. In proceſs of time, not only matters of grief, but joy, wiſhes, prayers, expoſtulations, reproaches, admonitions, and almoſt every other ſubject, were admitted into elegy; however, funeral lamentations and affairs of love ſeem moſt agreeable to its character.

The plaintive elegy, in mournful ſtate,
Diſhevell'd weeps the ſtern decrees of fate:
Now paints the lover's torments and delights;
Now the nymph flatters, threatens, or invites.
But he, who would theſe paſſions well expreſs,
Muſt more of love than poetry poſſeſs.
I hate thoſe lifeleſs writers whoſe forc'd fire
In a cold ſtyle deſcribes a hot deſire;
Who ſigh by rule, and, raging in cold blood,
Their ſluggiſh muſe ſpur to an am'rous mood.
Their ecſtaſies inſipidly they feign;
And always pine, and fondly hug their chain;
Adore their priſon, and their ſufferings bleſs;
Make ſenſe and reaſon quarrel as they pleaſe.
'Twas not of old in this affected tone,
That ſmooth Tibullus made his am'rous moan;
Or tender Ovid, in melodious ſtrains,
Of love's dear art the pleaſing rules explains.
You, who in elegy would juſtly write,
Conſult your heart; let that alone endite.

[*From the French of Deſpreux.*] Soames.

The plan of an elegy, as indeed of all other poems, ought to be made before a line is written; or elſe the author will ramble in the dark, and his verſes have no dependance on each other. No *epigrammatic points* or conceits, none of thoſe *fine things* which moſt people are ſo fond of in every ſort of poem, can be allowed in this, but muſt give place to nobler beauties, thoſe of *nature* and the *paſſions*. Elegy rejects whatever is facetious, ſatirical, or majeſtic, and is content to be plain, decent, and unaffected; yet in this humble ſtate is ſhe ſweet and engaging, elegant and attractive. This poem is adorned with frequent *commiſerations*, *complaints*, *exclamations*, *addreſſes to things or perſons*, ſhort and proper *digreſſions*, *alluſions*, *compariſons*, *proſopopœias* or feigned perſons, and ſometimes with ſhort *deſcriptions*. The diction ought to be free from any *harſhneſs*; *neat*, *eaſy*, *perſpicuous*, *expreſſive of the manners*, *tender*, and *pathetic*; and the numbers ſhould be *ſmooth* and *flowing*, and captivate the ear with their uniform ſweetneſs and delicacy.

Of elegies on the ſubject of death, that by Mr Gray, written in a country church-yard, is one of the beſt that has appeared in our language, and may be juſtly eſteemed

Elegy.

eſteemed a maſterpiece. But being ſo generally known, it would be ſuperfluous to inſert it here.

On the ſubject of love, we ſhall give an example from the elegies lately publiſhed by Mr Hammond.

Let others boaſt their heaps of ſhining gold,
And view their fields with waving plenty crown'd,
Whom neighb'ring foes in conſtant terror hold,
And trumpets break their ſlumbers, never ſound:
While, calmly poor, I trifle life away,
Enjoy ſweet leiſure by my cheerful fire,
No wanton hope my quiet ſhall betray,
But cheaply bleſs'd I'll ſcorn each vain deſire.
With timely care I'll ſow my little field,
And plant my orchard with its maſter's hand;
Nor bluſh to ſpread the hay, the hook to wield,
Or range the ſheaves along the ſunny land.
If late at duſk, while careleſsly I roam,
I meet a ſtrolling kid or bleating lamb,
Under my arm I'll bring the wand'rer home,
And not a little chide its thoughtleſs dam.
What joy to hear the tempeſt howl in vain,
And claſp a fearful miſtreſs to my breaſt?
Or lull'd to ſlumber by the beating rain,
Secure and happy ſink at laſt to reſt.
Or if the ſun in flaming Leo ride,
By ſhady rivers indolently ſtray,
And, with my Delia walking ſide by ſide,
Hear how they murmur, as they glide away.
What joy to wind along the cool retreat,
To ſtop and gaze on Delia as I go!
To mingle ſweet diſcourſe with kiſſes ſweet,
And teach my lovely ſcholar all I know!
Thus pleas'd at heart, and not with fancy's dream,
In ſilent happineſs I reſt unknown;
Content with what I am, not what I ſeem,
I live for Delia and myſelf alone.
Ah fooliſh man! who, thus of her poſſeſs'd,
Could float and wander with ambition's wind,
And, if his outward trappings ſpoke him bleſt,
Not heed the ſickneſs of his conſcious mind.
With her I ſcorn the idle breath of praiſe,
Nor truſt to happineſs that's not our own;
The ſmile of fortune might ſuſpicion raiſe,
But here I know that I am lov'd alone.
Stanhope, in wiſdom as in wit divine,
May riſe and plead Britannia's glorious cauſe,
With ſteady reign his eager wit confine,
While manly ſenſe the deep attention draws.
Let Stanhope ſpeak his liſt'ning country's wrong,
My humble voice ſhall pleaſe one partial maid;
For her alone I pen my tender ſong,
Securely ſitting in his friendly ſhade.
Stanhope ſhall come, and grace his rural friend;
Delia ſhall wonder at her noble gueſt,
With bluſhing awe the riper fruit commend,
And for her huſband's patron cull the beſt.
Her's be the care of all my little train,
While I with tender indolence am bleſt,
The favourite ſubject of her gentle reign,
By love alone diſtinguiſh'd from the reſt.
For her I'll yoke my oxen to the plough,
In gloomy foreſts tend my lonely flock,
For her a goat-herd climb the mountain's brow,
And ſleep extended on the naked rock.
Ah! what avails to preſs the ſtately bed,
And far from her 'midſt taſteleſs grandeur weep,
By warbling fountains lay the penſive head,
And, while they murmur, ſtrive in vain to ſleep!
Delia alone can pleaſe and never tire,
Exceed the paint of thought in true delight;
With her, enjoyment wakens new deſire,
And equal rapture glows thro' every night.
Beauty and worth, alone in her, contend,
To charm the fancy, and to fix the mind;
In her, my wife, my miſtreſs, and my friend,
I taſte the joys of ſenſe and reaſon join'd.
On her I'll gaze when others loves are o'er,
And dying preſs her with my clay-cold hand—
Thou weep'ſt already, as I were no more,
Nor can that gentle breaſt the thought withſtand.
Oh! when I die, my lateſt moments ſpare,
Nor let thy grief with ſharper torments kill:
Wound not thy cheeks, nor hurt that flowing hair;
Tho' I am dead, my ſoul ſhall love thee ſtill.
Oh quit the room, oh quit the deathful bed,
Or thou wilt die, ſo tender is thy heart!
Oh leave me, Delia! ere thou ſee me dead,
Theſe weeping friends will do thy mournful part.
Let them, extended on the decent bier,
Convey the corſe in melancholy ſtate,
Thro' all the village ſpread the tender tear,
While pitying maids our wond'rous loves relate.

Paſtoral.

Sect. IV. *Of the Paſtoral.*

63. This poem takes its name from the Latin word *paſtor*, a "ſhepherd;" the ſubject of it being ſomething in the paſtoral or rural life; and the perſons, or interlocutors, introduced in it, either ſhepherds or other ruſtics.

Theſe poems are frequently called *eclogues*, which ſignifies "ſelect or choice pieces;" though ſome account for this name in a different manner. They are alſo called *bucolicks*, from Βουκολος, a "herdſman."

This kind of poem, when happily executed, gives great delight; nor is it a wonder, ſince innocence and ſimplicity generally pleaſe: to which let us add, that the ſcenes of paſtorals are generally laid in the country, where both poet and painter have abundant matter for the exerciſe of genius, ſuch as enchanting proſpects, purling ſtreams, ſhady groves, enamelled meads, flowery lawns, rural amuſements, the bleating of flocks, and the muſic of birds; which is of all melody the moſt ſweet and pleaſing, and calls to our mind the wiſdom and taſte of Alexander, who, on being importuned to hear a man that imitated the notes of the nightingale, and was thought a great curioſity, replied, that *he had had the happineſs of hearing the nightingale herſelf.*

The character of the paſtoral conſiſts in ſimplicity, brevity, and delicacy; the two firſt render an eclogue *natural*, and the laſt *delightful*. With reſpect to nature, indeed, we are to conſider, that as a paſtoral is an image of the ancient times of innocence and undeſigning plainneſs, we are not to deſcribe ſhepherds as they really are at this day, but as they may be conceived then to have been, when the beſt of men, and even princes, followed the employment. For this reaſon, an air of piety ſhould run through the whole poem; which is viſible in the writings of antiquity.

To make it natural with reſpect to the preſent age, ſome knowledge in rural affairs ſhould be diſcovered, and that in ſuch a manner as if it was done by chance rather than by deſign; leſt by too much pains to ſeem natural, that ſimplicity be deſtroyed from whence ariſes the delight; for what is ſo engaging in this kind of poeſy proceeds not ſo much from the idea of a country life itſelf, as in expoſing only the beſt part of a ſhepherd's life, and concealing the misfortunes and miſeries which ſometimes attend it. Beſides, the ſubject muſt contain ſome particular beauty in itſelf, and each eclogue preſent a ſcene or proſpect to our view enriched with variety: which variety is in a great meaſure obtained by frequent compariſons drawn from the moſt agreeable objects of the country; by interrogations to things inanimate; by ſhort and beautiful digreſſions; and by elegant turns on the words, which render the numbers more ſweet and pleaſing. To this let us add, that the connections muſt be negligent, the narrations and deſcriptions ſhort, and the periods conciſe.

Riddles, parables, proverbs, antique phraſes, and ſuperſtitious fables, are fit materials to be intermixed with this kind of poem. They are here, when properly applied, very ornamental; and the more ſo, as they give our modern compoſitions the air of the ancient manner of writing.

The ſtyle of the paſtoral ought to be humble, yet pure; neat, but not florid; eaſy, and yet lively: and the numbers ſhould be ſmooth and flowing.

This poem in general ſhould be ſhort, and ought never much to exceed 100 lines; for we are to conſider that the ancients made theſe ſort of compoſitions their amuſement, and not their buſineſs: but however ſhort they are, every eclogue muſt contain a plot or fable, which muſt be ſimple and one; but yet ſo managed as to admit of ſhort digreſſions. Virgil has always obſerved this——We ſhall give the plot or argument of his firſt paſtoral as an example. Melibœus, *an unfortunate ſhepherd, is introduced with* Tityrus, *one in more fortunate circumſtances; the former addreſſes the complaint of his ſufferings and baniſhment to the latter, who enjoys his flocks and folds in the midſt of the public calamity, and therefore expreſſes his gratitude to the benefactor from whom this favour flowed: but* Melibœus *accuſes fortune, civil wars, and bids adieu to his native country.* This is therefore a dialogue.

But we are to obſerve, that the poet is not always obliged to make his eclogue *allegorical*, and to have real perſons repreſented by the fictitious characters introduced; but is in this reſpect entirely at his own liberty.

Nor does the nature of the poem require it to be always carried on by way of dialogue; for a ſhepherd may with propriety ſing the praiſes of his love, complain of her inconſtancy, lament her abſence, her death, &c. and addreſs himſelf to groves, hills, rivers, and ſuch like rural objects, even when alone.

We ſhall now give an example from each of thoſe authors who have eminently diſtinguiſhed themſelves by this manner of writing, and introduce them in the order of time in which they were written.

64. Theocritus, who was the father or inventor of this kind of poetry, has been deſervedly eſteemed by the beſt critics; and by ſome, whoſe judgment we cannot diſpute, preferred to all other paſtoral writers. We ſhall inſert his third *idyllium*, not becauſe it is the beſt, but becauſe it is within our compaſs.

To Amaryllis, lovely nymph, I ſpeed,
Mean while my goats upon the mountains feed:
O Tityrus, tend them with aſſiduous care,
Lead them to cryſtal ſprings and paſtures fair,
And of the ridgling's butting horns beware.
Sweet Amaryllis, have you then forgot,
Our ſecret pleaſures in the conſcious grott,
Where in my folding arms you lay reclin'd?
Bleſt was the ſhepherd, for the nymph was kind.
I whom you call'd *your Dear, your Love,* ſo late,
Say, am I now the object of your hate?
Say, is my form diſpleaſing to your ſight?
This cruel love will ſurely kill me quite.
Lo! ten large apples, tempting to the view,
Pluck'd from your favourite tree, where late they grew.
Accept this boon, 'tis all my preſent ſtore;
To-morrow will produce as many more.
Mean while theſe heart-conſuming pains remove,
And give me gentle pity for my love.
Oh was I made by ſome transforming power
A bee to buzz in your ſequeſter'd bow'r!
To pierce your ivy ſhade with murmuring ſound,
And the light leaves that compaſs you around.
I know thee, Love, and to my ſorrow find,
A god thou art, but of the ſavage kind;
A lioneſs ſure ſuckled the fell child,
And with his brothers nurſt him in the wild;
On me his ſcorching flames inceſſant prey,
Glow in my bones, and melt my ſoul away.
Ah, nymph, whoſe eyes deſtructive glances dart,
Fair is your face, but flinty is your heart:
With kiſſes kind this rage of love appeaſe;
For me, fond ſwain! ev'n empty kiſſes pleaſe.
Your ſcorn diſtracts me, and will make me tear
The flow'ry crown I wove for you to wear,
Where roſes mingle with the ivy-wreath,
And fragrant herbs ambroſial odours breathe.
Ah me! what pangs I feel; and yet the fair
Nor ſees my ſorrows, nor will hear my pray'r.
I'll doff my garments, ſince I needs muſt die,
And from yon rock, that points its ſummit high,
Where patient Alpis ſnares the finny fry,
I'll leap, and, though perchance I riſe again,
You'll laugh to ſee me plunging in the main.
By a prophetic poppy-leaf I found
Your chang'd affection, for it gave no ſound
Though in my hand ſtruck hollow as it lay,
But quickly wither'd like your love away.
An old witch brought ſad tidings to my ears,
She who tells fortunes with the ſieve and ſheers;
For leaſing barley in my fields of late,
She told me, I ſhould love, and you ſhould hate!
For you my care a milk-white goat ſupply'd,
Two wanton kids run friſking at her ſide;
Which oft the nut-brown maid, Erithacis,
Has begg'd, and paid before-hand with a kiſs;
And ſince you thus my ardent paſſion ſlight,
Her's they ſhall be before to-morrow night.
My right eye itches; may it lucky prove,
Perhaps I ſoon ſhall ſee the nymph I love;

Beneath yon pine I'll ſing diſtinct and clear,
Perhaps the fair my tender notes ſhall hear;
Perhaps may pity my melodious moan;
She is not metamorphos'd into ſtone.
Hippomenes, provok'd by noble ſtriſe,
To win a miſtreſs, or to loſe his life,
Threw golden fruit in Atalanta's way:
The bright temptation caus'd the nymph to ſtay;
She look'd, ſhe languiſh'd, all her ſoul took fire,
She plung'd into the gulph of deep deſire,
To Pyle from Othrys ſage Melampus came,
He drove the lowing herd, yet won the dame;
Fair Pero bleſt his brother Bias' arms,
And in a virtuous race diffus'd unfading charms.
Adonis fed his cattle on the plain,
And ſea-born Venus lov'd the rural ſwain;
She mourn'd him wounded in the fatal chace,
Nor dead diſmiſs'd him from her warm embrace.
Though young Endymion was by Cynthia bleſt,
I envy nothing but his laſting reſt.
Jaſion ſlumb'ring on the Cretan plain
Ceres once ſaw, and bleſt the happy ſwain
With pleaſures too divine for ears profane.
My head grows giddy, love affects me ſore;
Yet you regard not; ſo I'll ſing no more——
Here will I put a period to my care—
Adieu, falſe nymph, adieu, ungrateful fair:
Stretch'd near the grotto, when I've breath'd my laſt,
My corſe will give the wolves a rich repaſt,
As ſweet to them as honey to your taſte.

FAWKES.

65. Virgil ſucceeds Theocritus, from whom he has in ſome places copied, and always imitated with ſucceſs. As a ſpecimen of his manner, we ſhall introduce his firſt paſtoral, which is generally allowed to be the moſt perfect.

MELIBOEUS and TITYRUS.

Mel. Beneath the ſhade which beechen boughs diffuſe,
You, Tityrus, entertain your ſylvan muſe.
Round the wide world in baniſhment we roam,
Forc'd from our pleaſing fields and native home;
While ſtretch'd at eaſe you ſing your happy loves,
And Amaryllis fills the ſhady groves.
Tit. Theſe bleſſings, friend, a deity beſtow'd;
For never can I deem him leſs than god.
The tender firſtlings of my woolly breed
Shall on his holy altar often bleed.
He gave me kine to graze the flow'ry plain,
And ſo my pipe renew'd the rural ſtrain.
Mel. I envy not your fortune; but admire,
That while the raging ſword and waſteful fire
Deſtroy the wretched neighbourhood around,
No hoſtile arms approach your happy ground.
Far diff'rent is my fate; my feeble goats
With pains I drive from their forſaken cotes:
And this you ſee I ſcarcely drag along,
Who yeaning on the rocks has left her young,
The hope and promiſe of my falling fold,
My loſs by dire portents the gods foretold;
For, had I not been blind, I might have ſeen
Yon riven oak, the faireſt on the green,
And the hoarſe raven on the blaſted bough
By croaking from the left preſag'd the coming blow.
But tell me, Tityrus, what heav'nly pow'r
Preſerv'd your fortunes in that fatal hour?
Tit. Fool that I was, I thought imperial Rome
Like Mantua, where on market-days we come,
And thither drive our tender lambs from home.
So kids and whelps their ſires and dams expreſs;
And ſo the great I meaſur'd by the leſs;
But country-towns, compar'd with her, appear
Like ſhrubs when lofty cypreſſes are near.
Mel. What great occaſion call'd you hence to Rome?
Tit. Freedom, which came at length, tho' ſlow to come:
Nor did my ſearch of liberty begin
Till my black hairs were chang'd upon my chin.
Nor Amaryllis would vouchſafe a look,
Till Galatea's meaner bonds I broke.
Till then a helpleſs, hopeleſs, homely ſwain,
I ſought not freedom, nor aſpir'd to gain:
Tho' many a victim from my folds was bought,
And many a cheeſe to country markets brought,
Yet all the little that I got I ſpent,
And ſtill return'd as empty as I went.
Mel. We ſtood amaz'd to ſee your miſtreſs mourn,
Unknowing that ſhe pin'd for your return;
We wonder'd why ſhe kept her fruit ſo long,
For whom ſo late th' ungather'd apples hung:
But now the wonder ceaſes, ſince I ſee
She kept them only, Tityrus, for thee:
For thee the bubbling ſprings appear'd to mourn,
And whiſp'ring pines made vows for thy return.
Tit. What ſhould I do? while here I was enchain'd,
No glimpſe of godlike liberty remain'd;
Nor could I hope in any place but there
To find a god ſo preſent to my pray'r.
There firſt the youth of heav'nly birth I view'd,
For whom our monthly victims are renew'd.
He heard my vows, and graciouſly decreed
My grounds to be reſtor'd, my former flocks to feed.
Mel. O fortunate old man! whoſe farm remains
For you ſufficient, and requites your pains,
Though ruſhes overſpread the neighb'ring plains,
Tho' here the marſhy grounds approach your fields
And there the ſoil a ſtony harveſt yields.
Your teeming ewes ſhall no ſtrange meadows try,
Nor fear a rot from tainted company.
Behold yon bord'ring fence of ſallow trees
Is fraught with flow'rs, the flow'rs are fraught with bees:
The buſy bees, with a ſoft murm'ring ſtrain,
Invite to gentle ſleep the lab'ring ſwain:
While from the neighb'ring rock with rural ſongs
The pruner's voice the pleaſing dream prolongs;
Stock-doves and turtles tell their am'rous pain,
And, from the lofty elms, of love complain.
Tit. Th' inhabitants of ſeas and ſkies ſhall change,
And fiſh on ſhore and ſtags in air ſhall range,
The baniſh'd Parthian dwell on Arar's brink,
And the blue German ſhall the Tigris drink;
Ere I, forſaking gratitude and truth,
Forget the figure of that godlike youth.
Mel. But we muſt beg our bread in climes unknown,
Beneath the ſcorching or the freezing zone;
And ſome to fair Oaxis ſhall be ſold,
Or try the Libyan heat, or Scythian cold;
The reſt among the Britons be confin'd,
A race of men from all the world disjoin'd.

O! muſt the wretched exiles ever mourn?
Nor after length of rolling years return?
Are we condemn'd by fate's unjuſt decree,
No more our houſes and our homes to ſee?
Or ſhall we mount again the rural throne,
And rule the country, kingdoms once our own?
Did we for theſe barbarians plant and ſow,
On theſe, on theſe, our happy fields beſtow?
Good heav'n, what dire effects from civil diſcord flow!
Now let me graft my pears, and prune the vine;
The fruit is theirs, the labour only mine.
Farewel my paſtures, my paternal ſtock,
My fruitful fields, and my more fruitful flock!
No more, my goats, ſhall I behold you climb
The ſteepy cliffs, or crop the flow'ry thyme;
No more extended in the grot below,
Shall ſee you browzing on the mountain's brow
The prickly ſhrubs, and after on the bare
Lean down the deep abyſs and hang in air!
No more my ſheep ſhall ſip the morning dew;
No more my ſong ſhall pleaſe the rural crew:
Adieu, my tuneful pipe! and all the world, adieu!
Ti. This night, at leaſt, with me forget your care;
Cheſnuts and curds and cream ſhall be your fare:
The carpet-ground ſhall be with leaves o'er-ſpread,
And boughs ſhall weave a cov'ring for your head:
For ſee yon ſunny hill the ſhade extends,
And curling ſmoke from cottages aſcends.

DRYDEN.

66. Spenſer was the firſt of our countrymen, who acquired any conſiderable reputation by this method of writing. We ſhall inſert his ſixth eclogue, or that for June, which is allegorical, as will be ſeen by the

ARGUMENT. "Hobbinol, from a deſcription of the pleaſures of the place, excites Colin to the enjoyment of them. Colin declares himſelf incapable of delight, by reaſon of his ill ſucceſs in love, and his loſs of Roſalind, who had treacherouſly forſaken him for Menalcas, another ſhepherd. By Tityrus (mentioned before in Spenſer's ſecond eclogue, and again in the twelfth) is plainly meant Chaucer, whom the author ſometimes profeſſed to imitate. In the perſon of Colin, is repreſented the author himſelf; and Hobbinol's inviting him to leave the hill country, ſeems to allude to his leaving the North, where, as is mentioned in his life, he had for ſome time reſided."

Hob. Lo! Colin, here the place, whoſe pleaſant ſight
From other ſhades hath wean'd my wand'ring mind:
Tell me, what wants me here, to work delight?
The ſimple air, the gentle warbling wind,
So calm, ſo cool, as nowhere elſe I find:
The graſſy ground with dainty daiſies dight,
The bramble-buſh, where birds of every kind
To th' water's fall their tunes attemper right.
Col. O! happy Hobbinol, I bleſs thy ſtate,
That paradiſe haſt found which Adam loſt.
Here wander may thy flock early or late,
Withouten dread of wolves to been ytoſt;
Thy lovely lays here mayſt thou freely boaſt?
But I, unhappy man! whom cruel fate,
And angry Gods, purſue from coaſt to coaſt,
Can nowhere find to ſhroud my luckleſs pate.
Hob. Then if by me thou liſt adviſed be,
Forſake the ſoil that ſo doth thee bewitch:
Leave me thoſe hills, where harbroughnis to ſee,
Nor holly-buſh, nor brere, nor winding ditch;
And to the dales reſort, where ſhepherds rich,
And fruitful flocks been every where to ſee:
Here no night-ravens lodge, more black than pitch,
Nor elviſh ghoſts, nor ghaſtly owls do flee.
But friendly fairies met with many graces,
And light-foot nymphs can chace the ling'ring night,
With heydeguies, and trimly trodden traces;
Whilſt ſiſters nine, which dwell on Parnaſs' height,
Do make them muſic, for their more delight;
And Pan himſelf to kiſs their cryſtal faces,
Will pipe and dance, when Phœbe ſhineth bright:
Such peerleſs pleaſures have we in theſe places.
Col. And I, whilſt youth, and courſe of careleſs years,
Did let me walk withouten links of love,
In ſuch delights did joy amongſt my peers:
But riper age ſuch pleaſures doth reprove,
My fancy eke from former follies move
To ſtrayed ſteps: for time in paſſing wears
(As garments doen, which waxen old above)
And draweth new delights with hoary hairs.
Though couth I ſing of love, and tune my pipe
Unto my plantive pleas in verſes made:
Though would I ſeek for queen-apples unripe
To give my Roſalind, and in ſommer ſhade
Dight gawdy girlonds was my common trade,
To crown her golden locks: but years more ripe,
And loſs of her, whoſe love as life I wayde,
Thoſe weary wanton toys away did wipe.
Hob. Colin, to hear thy rhymes and roundelays,
Which thou wert wont on waſteful hills to ſing,
I more delight, than lark in ſommer days:
Whoſe echo made the neighbour groves to ring,
And taught the birds, which in the lower ſpring
Did ſhroud in ſhady leaves from ſunny rays,
Frame to thy ſong their cheerful cheriping,
Or hold their peace, for ſhame of thy ſweet lays.
I ſaw Calliope with muſes moe,
Soon as thy oaten pipe began to ſound,
Their ivory lutes and tamburins forego,
And from the fountain, where they ſate around,
Ren after haſtily thy ſilver ſound.
But when they came, where thou thy ſkill didſt ſhow,
They drew aback, as half with ſhame confound,
Shepherd to ſee, them in their art out-go.
Col. Of muſes, Hobbinol, I con no ſkill,
For they been daughters of the higheſt Jove,
And holden ſcorn of homely ſhepherds quill:
For ſith I heard that Pan with Phœbus ſtrove
Which him to much rebuke and danger drove,
I never liſt preſume to Parnaſs' hill,
But piping low, in ſhade of lowly grove,
I play to pleaſe myſelf, albeit ill.
Nought weigh I, who my ſong doth praiſe or blame,
Ne ſtrive to win renown, or paſs the reſt:
With ſhepherds fits not follow flying fame,
But feed his flocks in fields, where falls him beſt.
I wot my rimes been rough, and rudely dreſt;
The fitter they, my careful caſe to frame:
Enough is me to paint out my unreſt,
And pour my piteous plaints out in the ſame.
The God of ſhepherds, Tityrus, is dead,
Who taught me homely, as I can, to make:

He, whilſt he lived, was the ſovereign head
Of ſhepherds all, that been with love ytake.
Well couth he wail his woes, and lightly ſlake
The flames which love within his heart had bred,
And tell us merry tales, to keep us wake,
The while our ſheep about us ſafely fed.
Now dead he is, and lieth wrapt in lead,
(O why ſhould death on him ſuch outrage ſhow!)
And all his paſſing ſkill with him is fled,
The fame whereof doth daily greater grow.
But if on me ſome little drops would flow
Of that the ſpring was in his learned hed,
I ſoon would learn theſe woods to wail my woe,
And teach the trees their trickling tears to ſhed.
Then ſhould my plaints, cauſ'd of diſcourteſee,
As meſſengers of this my painful plight,
Fly to my love, wherever that ſhe be,
And pierce her heart with point of worthy wight;
As ſhe deſerves, that wrought ſo deadly ſpight.
And thou, Menalcas, that by treachery
Didſt underfong my laſs to wax ſo light,
Should'ſt well be known for ſuch thy villany.
But ſince I am not, as I wiſh I were,
Ye gentle ſhepherds, which your flocks do feed,
Whether on hills or dales, or other where,
Bear witneſs all of this ſo wicked deed:
And tell the laſs, whoſe flower is woxe a weed,
And faultleſs faith is turn'd to faithleſs feere,
That ſhe the trueſt ſhepherd's heart made bleed,
That lives on earth, and loved her moſt dear.
Hob. O! careful Colin, I lament thy caſe,
Thy tears would make the hardeſt flint to flow!
Ah! faithleſs Roſalind, and void of grace,
That art the root of all this rueful woe!
But now is time, I gueſs, homeward to go;
Then riſe, ye bleſſed flocks, and home apace,
Leſt night with ſtealing ſteps do you foreſlo,
And wet your tender lambs that by you trace.

67. By the following eclogue the reader will perceive that Mr Philips has, in imitation of Spencer, preſerved in his paſtorals many antiquated words, which, though they are diſcarded from polite converſation, may naturally be ſuppoſed ſtill to have place among the ſhepherds and other ruſticks in the country. We have made choice of his ſecond eclogue, becauſe it is brought home to his own buſineſs, and contains a complaint againſt thoſe who had ſpoken ill of him and his writings.

THENOT, COLINET.

Th. Is it not Colinet I loneſome ſee
Leaning with folded arms againſt the tree?
Or is it age of late bedims my ſight?
'Tis Colinet, indeed, in woful plight.
Thy cloudy look, why melting into tears,
Unſeemly, now the ſky ſo bright appears?
Why in this mournful manner art thou found,
Unthankful lad, when all things ſmile around?
Or hear'ſt not lark and linnet jointly ſing,
Their notes blithe-warbling to ſalute the ſpring?
Co. Tho' blithe their notes, not ſo my wayfard fate;
Nor lark would ſing, nor linnet, in my ſtate.
Each creature, Thenot, to his taſk is born;
As they to mirth and muſic, I to mourn.
Waking, at midnight, I my woes renew,
My tears oft mingling with the falling dew.
Th. Small cauſe, I ween, has luſty youth to plain;
Or who may then the weight of eld ſuſtain,
When every ſlackening nerve begins to fail,
And the load preſſeth as our days prevail?
Yet, though with years my body downward tend,
As trees beneath their fruit in autumn bend,
Spite of my ſnowy head and icy veins,
My mind a cheerful temper ſtill retains:
And why ſhould man, miſhap what will, repine,
Sour every ſweet, and mix with tears his wine?
But tell me then; it may relieve thy wo,
To let a friend thine inward ailment know.
Co. Idly 'twill waſte thee, Thenot, the whole day,
Should'ſt thou give ear to all my grief can ſay.
Thine ewes will wander; and the heedleſs lambs,
In loud complaints, require their abſent dams.
Th. See Lightfoot; he ſhall tend them cloſe: and I,
'Tween whiles, a-croſs the plain will glance mine eye.
Co. Where to begin I know not, where to end.
Does there one ſmiling hour my youth attend?
Though few my days, as well my follies ſhow,
Yet are thoſe days all clouded o'er with wo:
No happy gleam of ſunſhine doth appear,
My low'ring ſky and wint'ry months to cheer.
My piteous plight in yonder naked tree,
Which bears the thunder-ſcar, too plain I ſee:
Quite deſtitute it ſtands of ſhelter kind,
The mark of ſtorms, and ſport of every wind:
The riven trunk feels not th' approach of ſpring;
Nor birds among the leafleſs branches ſing:
No more, beneath thy ſhade, ſhall ſhepherds throng
With jocund tale, or pipe, or pleaſing ſong.
Ill-fated tree! and more ill-fated I!
From thee, from me, alike the ſhepherds fly.
Th. Sure thou in hapleſs hour of time waſt born,
When blightning mildews ſpoil the riſing corn,
Or blaſting winds o'er bloſſom'd hedge-rows paſs,
To kill the promis'd fruits, and ſcorch the graſs;
Or when the moon, by wizard charm'd, foreſhows,
Blood-ſtain'd in foul eclipſe, impending woes.
Untimely born, ill luck betides thee ſtill.
Co. And can there, Thenot, be a greater ill?
Th. Nor fox, nor wolf, nor rot among our ſheep:
From theſe good ſhepherd's care his flock may keep:
Againſt ill-luck, alas! all forcaſt fails;
Nor toil by day, nor watch by night, avails.
Co. Ah me, the while! ah me, the luckleſs day!
Ah luckleſs lad! befits me more to ſay.
Unhappy hour! when freſh in youthful bud,
I left, Sabrina fair, thy ſilv'ry flood.
Ah, ſilly I! more ſilly than my ſheep,
Which on thy flow'ry banks I wont to keep.
Sweet are thy banks; oh, when ſhall I once more,
With raviſh'd eyes review thine amell'd ſhore?
When, in the cryſtal of thy waters, ſcan
Each feature faded, and my colour wan?
When ſhall I ſee my hut, the ſmall abode
Myſelf did raiſe and cover o'er with ſod?
Small though it be, a mean and humble cell,
Yet is there room for peace, and me, to dwell.
Th. And what enticement charm'd thee, far away,
From thy lov'd home, and led thy heart aſtray?

Co. A lewd deſire ſtrange lands, and ſwains, to know.
Ah me! that ever I ſhould covet woe.
With wand'ring feet unbleſt, and fond of fame,
I ſought I know not what beſides a name.
Th. Or, ſooth to ſay, did'ſt thou not hither rome
In ſearch of gains more plenty than at home?
A rolling ſtone is, ever, bare of moſs;
And, to their coſt, green years old proverbs croſs.
Co. Small need there was, in random ſearch of gain,
To drive my pining flock athwart the plain,
To diſtant Cam. Fine gain at length, I trow,
To hoard up to myſelf ſuch deal of woe!
My ſheep quite ſpent through travel and ill fare,
And like their keeper ragged grown and bare,
The damp cold green ſward for my nightly bed,
And ſome ſlaunt willow's trunk to reſt my head.
Hard is to bear of pinching cold the pain;
And hard is want to the unpractis'd ſwain;
But neither want, nor pinching cold, is hard,
To blaſting ſtorms of calumny compar'd:
Unkind as hail it falls; the pelting ſhow'r
Deſtroys the tender herb and budding flow'r.
Th. Slander we ſhepherds count the vileſt wrong:
And what wounds ſorer than an evil tongue?
Co. Untoward lads, the wanton imps of ſpite,
Make mock of all the ditties I endite.
In vain, O Colinet, thy pipe, ſo ſhrill,
Charms every vale, and gladdens every hill:
In vain thou ſeek'ſt the coverings of the grove,
In the cool ſhade to ſing the pains of love:
Sing what thou wilt, ill-nature will prevail;
And every elf hath ſkill enough to rail.
But yet, though poor and artleſs be my vein,
Menalcas ſeems to like my ſimple ſtrain:
And, while that he delighteth in my ſong,
Which to the good Menalcas doth belong,
Nor night, nor day, ſhall my rude muſic ceaſe;
I aſk no more, ſo I Menalcas pleaſe.
Th. Menalcas, lord of theſe fair fertile plains,
Preſerves the ſheep, and o'er the ſhepherds reigns:
For him our yearly wakes and feaſts we hold,
And chooſe the faireſt firſtlings from the fold;
He, good to all, who good deſerves, ſhall give
Thy flock to feed, and thee at eaſe to live,
Shall curb the malice of unbridled tongues,
And bounteouſly reward thy rural ſongs.
Co. Firſt, then, ſhall lightſome birds forget to fly,
The briny ocean turn to paſtures dry,
And every rapid river ceaſe to flow,
Ere I unmindful of Menalcas grow.
Th. This night thy care with me forget, and fold
Thy flock with mine, to ward th' injurious cold.
New milk, and clouted cream, mild cheeſe and curd,
With ſome remaining fruit of laſt year's hoard,
Shall be our ev'ning fare; and, for the night,
Sweet herbs and moſs, which gentle ſleep invite:
And now behold the ſun's departing ray,
O'er yonder hill, the ſign of ebbing day:
With ſongs the jovial hinds return from plow;
And unyok'd heifers, loitering homeward, low.

68. Mr Pope's Paſtorals next appeared, but in a different dreſs from thoſe of Spenſer and Phillips; for he has diſcarded all antiquated words, drawn his ſwains more modern and polite, and made his numbers exquiſitely harmonious: his eclogues therefore may be called *better poems*, but not better paſtorals. We ſhall inſert the eclogue he has inſcribed to Mr Wycherly the beginning of which is in imitation of Virgil's firſt paſtoral.

Beneath the ſhade a ſpreading beech diſplays,
Hylas and Ægon ſung their rural lays:
This mourn'd a faithleſs, that an abſent love,
And Delia's name and Doris fill'd the grove.
Ye Mantuan nymphs, your ſacred ſuccour bring;
Hylas and Ægon's rural lays I ſing.
Thou, whom the nine with Plautus' wit inſpire,
The art of Terence, and Menander's fire:
Whoſe ſenſe inſtructs us, and whoſe humour charms,
Whoſe judgment ſways us, and whoſe ſpirit warms!
Oh, ſkill'd in nature! ſee the hearts of ſwains,
Their artleſs paſſions, and their tender pains.
Now ſetting Phœbus ſhone ſerenely bright,
And fleecy clouds were ſtreak'd with purple light;
When tuneful Hylas, with melodious moan,
Taught rocks to weep, and made the mountains groan.
Go, gentle gales, and bear my ſighs away!
To Delia's ear the tender notes convey.
As ſome ſad turtle his loſt love deplores,
And with deep murmurs fills the ſounding ſhores;
Thus, far from Delia, to the winds I mourn,
Alike unheard, unpity'd, and forlorn.
Go, gentle gales, and bear my ſighs along!
For her, the feather'd quires neglect their ſong;
For her, the limes their pleaſing ſhades deny;
For her, the lilies hang their head and die.
Ye flow'rs, that droop, forſaken by the ſpring,
Ye birds, that left by ſummer ceaſe to ſing,
Ye trees, that fade when autumn-heats remove,
Say, is not abſence death to thoſe who love?
Go, gentle gales, and bear my ſighs away!
Curs'd be the fields that cauſe my Delia's ſtay:
Fade ev'ry bloſſom, wither ev'ry tree,
Die ev'ry flow'r, and periſh all but ſhe.
What I have ſaid? where'er my Delia flies,
Let ſpring attend, and ſudden flow'rs ariſe;
Let opening roſes knotted oaks adorn,
And liquid amber drop from ev'ry thorn.
Go, gentle gales, and bear my ſighs along!
The birds ſhall ceaſe to tune their evening ſong,
The winds to breathe, the waving woods to move,
And ſtreams to murmur, ere I ceaſe to love.
Not bubbling fountains to the thirſty ſwain,
Not balmy ſleep to lab'rers faint with pain,
Not ſhow'rs to larks, or ſunſhine to bee,
Are half ſo charming as thy ſight to me.
Go, gentle gales, and bear my ſighs away!
Come, Delia, come; ah, why this long delay?
Thro' rocks and caves the name of *Delia* ſounds;
Delia, each cave and echoing rock rebounds.
Ye pow'rs, what pleaſing frenzy ſooths my mind!
Do lovers dream, or is my Delia kind?
She comes, my Delia comes!—now ceaſe, my lay;
And ceaſe, ye gales, to bear my ſighs away!
Next Ægon ſung, while Windſor groves admir'd;
Rehearſe, ye muſes, what yourſelves inſpir'd.
Reſound ye hills, reſound my mournful ſtrain!
Of perjur's Doris, dying I complain:

Here where the mountains, leſs'ning as they riſe,
Loſe the low vales, and ſteal into the ſkies;
While lab'ring oxen, ſpent with toil and heat,
In their looſe traces from the field retreat;
While curling ſmokes from village-tops are ſeen,
And the fleet ſhades glide o'er the duſky green.
Reſound, ye hills, reſound my mournful lay!
Beneath yon poplar oft we paſs'd the day:
Oft on the rind I carv'd her am'rous vows,
While ſhe with garlands hung the bending boughs:
The garlands fade, the boughs are worn away;
So dies her love, and ſo my hopes decay.
Reſound, ye hills, reſound my mournful ſtrain!
Now bright Arcturus glads the teeming grain;
Now golden fruits in loaded branches ſhine,
And grateful cluſters ſwell with floods of wine;
Now bluſhing berries paint the yellow grove:
Juſt Gods! ſhall all things yield returns but love?
Reſound, ye hills, reſound my mournful lay!
The ſhepherds cry, "Thy flocks are left a prey."——
Ah! what avails it me the flocks to keep,
Who loſt my heart, while I preſerv'd my ſheep?
Pan came, and aſk'd, what magic caus'd my ſmart,
Or what ill eyes malignant glances dart?
What eyes but hers, alas! have pow'r to move?
And is there magic but what dwells in love?
Reſound, ye hills, reſound my mournful ſtrains!
I'll fly from ſhepherds, flocks, and flow'ry plains.——
From ſhepherds, flocks, and plains, I may remove,
Forſake mankind, and all the world—but love!
I know thee, love! wild as the raging main,
More fell than tygers on the Libyan plain:
Thou wert from Etna's burning entrails torn,
Got by fierce whirlwinds, and in thunder born.
Reſound, ye hills, reſound my mournful lay!
Farewel, ye woods, adieu the light of day!
One leap from yonder cliff ſhall end my pains.
No more, ye hills, no more reſound my ſtrains!
Thus ſung the ſhepherds till th' approach of night,
The ſkies yet bluſhing with departing light,
When falling dews with ſpangles deck'd the glade,
And the low ſun had lengthen'd ev'ry ſhade.

To theſe paſtorals, which are written agreeably to the taſte of antiquity, and the rules above preſcribed, we ſhall beg leave to ſubjoin another that may be called *burleſque paſtoral*, wherein the ingenious author, Mr Gay, has ventured to deviate from the beaten road, and deſcribed the ſhepherds and ploughmen of our own time and country, inſtead of thoſe of the Golden Age, to which the modern critics confine the paſtoral. His ſix paſtorals, which he calls the *Shepherd's Week*, are a beautiful and lively repreſentation of the manners, cuſtoms, and notions of our ruſtics. We ſhall inſert the firſt of them, entitled, *The Squabble*, wherein two clowns try to out-do each other in ſinging the praiſes of their ſweet-hearts, leaving it to a third to determine the controverſy. The perſons named are *Lobbin Clout*, *Cuddy*, and *Cloddipole*.

Lob. Thy younglings, Cuddy, are but juſt awake;
No throſtle ſhrill the bramble-buſh forſake;
No chirping lark the welkin ſheen * invokes;
No damſel yet the ſwelling udder ſtrokes;
O'er yonder hill does ſcant § the dawn appear;
Then why does Cuddy leave his cott ſo rear†?

* Shining or bright ſky.
§ Scarce.
† Early.

Cud. Ah Lobbin Clout! I ween‡ my plight is gueſt;
For *he that loves, a ſtranger is to reſt.*
If ſwains belye not, thou haſt prov'd the ſmart,
And Blouzalinda's miſtreſs of thy heart.
This riſing rear betokeneth well thy mind;
Thoſe arms are folded for thy Blouzalind.
And well, I trow, our piteous plights agree;
Thee Blouzalinda ſmites, Buxoma me.

Lob. Ah Blouzalind! I love thee more by half,
Than deer their fawns, or cows the new-fall'n calf.
Woe worth the tongue, may bliſters ſore it gall,
That names *Buxoma Blouzalind* withal!

Cud. Hold, witleſs Lobbin Clout, I thee adviſe,
Leſt bliſters ſore on thy own tongue ariſe.
Lo yonder Cloddipole, the blithſome ſwain,
The wiſeſt lout of all the neighb'ring plain!
From Cloddipole we learnt to read the ſkies,
To know when hail will fall, or winds ariſe.
He taught us erſt * the heifer's tail to view,
When ſtuck aloft, that ſhow'rs would ſtraight enſue:
He firſt that uſeful ſecret did explain,
That pricking corns foretold the gath'ring rain.
When ſwallows fleet ſoar high and ſport in air,
He told us that the welkin would be clear.
Let Cloddipole then hear us twain rehearſe,
And praiſe his ſweet-heart in alternate verſe.
I'll wager this ſame oaken ſtaff with thee,
That Cloddipole ſhall give the prize to me.

Lob. See this tobacco-pouch, that's lin'd with hair,
Made of the ſkin of ſleekeſt fallow-deer:
This pouch, that's tied with tape of reddeſt hue,
I'll wager, that the prize ſhall be my due.

Cud. Begin thy carrols then, thou vaunting ſlouch;
Be thine the oaken ſtaff, or mine the pouch.

Lob. My Blouzalinda is the blitheſt laſs,
Than primroſe ſweeter, or the clover-graſs.
Fair is the king-cup that in meadow blows,
Fair is the daiſy that beſide her grows;
Fair is the gilly-flow'r of gardens ſweet,
Fair is the marygold, for pottage meet:
But Blouzalind's than gilly-flow'r more fair,
Than daiſy, marygold, or king-cup rare.

Cud. My brown Buxoma is the feateſt maid
That e'er at wake delightſome gambol play'd;
Clean as young lambkins, or the gooſe's down,
And like the goldfinch in her Sunday gown.
The witleſs lamb may ſport upon the plain,
The friſking kid delight the gaping ſwain;
The wanton calf may ſkip with many a bound,
And my cur Tray play defteſt † feats around:
But neither lamb, nor kid, nor calf, nor Tray,
Dance like Buxoma on the firſt of May.

Lob. Sweet is my toil when Blouzalind is near;
Of her bereft, 'tis winter all the year.
With her no ſultry ſummer's heat I know;
In winter, when ſhe's nigh, with love I glow.
Come, Blouzalinda, eaſe thy ſwain's deſire,
My ſummer's ſhadow, and my winter's fire!

Cud. As with Buxoma once I work'd at hay,
E'en noon-tide labour ſeem'd an holiday;
And holidays, if haply ſhe were gone,
Like worky-days I wiſh'd would ſoon be done.
Eftſoons ‡, O ſweet-heart kind, my love repay,
And all the year ſhall then be holiday.

‡ Conceive.
* Formerly
† Nimbleſt
‡ Very ſoon

Lob. As Blouzalinda, in a gameſome mood,
Behind a hay-cock loudly laughing ſtood,
I ſlily ran and ſnatch'd a haſty kiſs;
She wip'd her lips, nor took it much amiſs.
Believe me, Cuddy, while I'm bold to ſay,
Her breath was ſweeter than the ripen'd hay.
Cud. As my Buxoma, in a morning fair,
With gentle finger ſtroak'd her milky care,
I quaintly * ſtole a kiſs; at firſt, 'tis true,
She frown'd, yet after granted one or two.
Lobbin, I ſwear, believe who will my vows,
Her breath by far excell'd the breathing cow's.
Lob. Leek to the Welch, to Dutchmen butter's dear,
Of Iriſh ſwains potatoes are the cheer;
Oats for their feaſts the Scottiſh ſhepherds grind,
Sweet turnips are the food of Blouzalind:
While ſhe loves turnips, butter I'll deſpiſe,
Nor leeks, nor oatmeal, nor potatoes prize.
Cud. In good roaſt-beef my landlord ſticks his knife,
The capon fat delights his dainty wife;
Pudding our parſon eats, the ſquire loves hare;
But white-pot thick is my Buxoma's fare.
While ſhe loves white-pot, capon ne'er ſhall be,
Nor hare, nor beef, nor pudding, food for me.
Lob. As once I play'd at blind-man's buff, it hapt
About my eyes the towel thick was wrapt:
I miſs'd the ſwains, and ſeiz'd on Blouzalind;
True ſpeaks that ancient proverb, Love is blind.
Cud. As at hot-cockles once I laid me down,
And felt the weighty hand of many a clown;
Buxoma gave a gentle tap, and I
Quick roſe, and read ſoft miſchief in her eye.
Lob. On two near elms, the ſlacken'd cord I hung;
Now high, now low, my Blouzalinda ſwung:
With the rude wind her rumpled garment roſe,
And ſhow'd her taper leg and ſcarlet hoſe.
Cud. Acroſs the fallen oak the plank I laid,
And myſelf pois'd againſt the tott'ring maid:
High leapt the plank, and down Buxoma fell;
I ſpy'd—but faithful ſweethearts never tell.
Lob. This riddle, Cuddy, if thou canſt, explain,
This wily riddle puzzles ev'ry ſwain:
What flow'r is that which bears the virgin's name,
The richeſt metal joined with the ſame *?
Cud. Anſwer, thou carle, and judge this riddle right,
I'll frankly own thee for a cunning wight:
What flow'r is that which royal honour craves,
Adjoin the virgin, and 'tis ſtrown on graves †?
Clod. Forbear, contending louts, give o'er your ſtrains;
An oaken ſtaff each merits for his pains.
But ſee the ſun-beams bright to labour warn,
And gild the thatch of goodman Hodge's barn.
Your herds for want of water ſtand a-dry;
They're weary of your ſongs—and ſo am I.

We have given the rules uſually laid down for paſtoral writing, and exhibited ſome examples which were written on this plan; but we have to obſerve, that this poem may ſometimes partake of more dignity, and aſpire even to the ſublime, without deviating from nature and right reaſon. The ſublime which ariſes from tumults, wars, and what are too often falſely called *great actions*, the paſtoral abhors; but that which is blended with the tender and pathetic may be introduced with propriety and elegance. And indeed if we conſider that the firſt ſhepherds were many of them princes, (for that Abraham, Moſes, and David, were ſuch, we have the teſtimony of the Scriptures), it will ſeem ſomewhat extraordinary that ſuch pains ſhould have been taken to exclude the ſublime from paſtoral writing; and we ſhall be inclined to admit Virgil's *Pollio*, the *Song of Solomon*, and Pope's *Meſſiah*, as paſtorals, till better reaſons are offered to the contrary than have yet appeared: for the true characteriſtic of paſtoral, and what diſtinguiſhes it from other writings, is its ſole confinement to rural affairs; and if this be obſerved, it can loſe nothing of its nature by any elevation of ſentiment or diction.

SECT. V. *Of Didactic or Preceptive Poetry.*

69. THE method of writing precepts in verſe, and embelliſhing them with the graces of poetry, had its riſe, we may ſuppoſe, from a due conſideration of the frailties and perverſeneſs of human nature; and was intended to engage the affections, in order to improve the mind and amend the heart.

Didactic or preceptive poetry, has been uſually employed either to illuſtrate and explain our moral duties, our philoſophical inquiries, our buſineſs and pleaſures; or in teaching the art of criticiſm or poetry itſelf. It may be adapted, however, to any other ſubject; and may in all caſes, where inſtruction is deſigned, be employed to good purpoſe. Some ſubjects, indeed, are more proper than others, as they admit of more poetical ornaments, and give a greater latitude to genius: but whatever the ſubject is, thoſe precepts are to be laid down that are the moſt uſeful; and they ſhould follow each other in a natural eaſy method, and be delivered in the moſt agreeable engaging manner. What the proſe writer tells you ought to be done, the poet often conveys under the form of a narration, or ſhows the neceſſity of in a deſcription; and by repreſenting the action as done, or doing, conceals the precept that ſhould enforce it. The poet likewiſe, inſtead of telling the whole truth, or laying down all the rules that are requiſite, ſelects ſuch parts only as are the moſt pleaſing, and communicates the reſt indirectly, without giving us an open view of them; yet takes care that nothing ſhall eſcape the reader's notice with which he ought to be acquainted. He diſcloſes juſt enough to lead the imagination into the parts that are concealed; and the mind, ever gratified with its own diſcoveries, is complimented with exploring and finding them out; which, though done with eaſe, ſeems ſo conſiderable, as not to be obtained but in conſequence of its own adroitneſs and ſagacity.

But this is not ſufficient to render didactic poetry always pleaſing: for where precepts are laid down one after another, and the poem is of conſiderable length, the mind will require ſome recreation and refreſhment by the way; which is to be procured by ſeaſonable moral reflections, pertinent remarks, familiar ſimilies, and deſcriptions naturally introduced, by alluſions to ancient hiſtories or fables, and by ſhort and pleaſant digreſſions and excurſions into more noble ſubjects, ſo aptly brought in, that they may ſeem to have a remote relation, and be of a piece with the poem. By thus varying the form of inſtruction, the poet gives life to his precepts, and awakens and ſecures our attention, without permitting us to ſee by what means we are

* Waggiſhly.

* Marygold.

† Roſemary.

are thus captivated: and his art is the more to be admired, becauſe it is ſo concealed as to eſcape the reader's obſervation.

The ſtyle, too, muſt maintain a dignity ſuitable to the ſubject, and every part be drawn in ſuch lively colours, that the things deſcribed may ſeem as if preſented to the reader's view.

But all this will appear more evident from example; and though entire poems of this kind are not within the compaſs of our deſign, we ſhall endeavour to ſelect ſuch paſſages as will be ſufficient to illuſtrate the rules we have here laid down.

We have already obſerved, that, according to the uſual diviſions, there are four kinds of didactic poems, viz. thoſe that reſpect our moral duties, our philoſophical ſpeculations, our buſineſs and pleaſures, or that give precepts for poetry and criticiſm.

70. On the firſt ſubject, indeed, we have ſcarce any thing that deſerves the name of poetry, except Mr Pope's *Eſſay on Man,* and his *Ethic Epiſtles;* to which therefore we refer as examples.

71. II. Thoſe preceptive poems that concern philoſophical ſpeculations, though the ſubject is ſo pregnant with matter, affords ſuch a field for fancy, and is ſo capable of every decoration, are but few. Lucretius is the moſt conſiderable among the ancients who has written in this manner; and among the moderns we know of none but ſmall detached pieces, except the poem called *Anti-Lucretius,* which has not yet received an Engliſh dreſs, and Dr Akenſide's *Pleaſures of the Imagination;* both which are worthy of our admiration. Some of the ſmall pieces are alſo well executed; and there is one entitled the *Univerſe,* written by Mr Baker, from which we ſhall borrow an example.

The author's ſcheme is in ſome meaſure coincident with Mr Pope's, ſo far eſpecially as it tends to reſtrain the pride of man, with which deſign it was profeſſedly written.

The paſſage we have ſelected is that reſpecting the planetary ſyſtem.

Unwiſe! and thoughtleſs! impotent! and blind!
Can wealth, or grandeur, ſatisfy the mind?
Of all thoſe pleaſures mortals moſt admire,
Is there one joy ſincere, that will not tire?
Can love itſelf endure? or beauty's charms
Afford that bliſs we fancy in its arms?—
Then, let thy ſoul more glorious aims purſue:
Have thy CREATOR and his works in view.
Be theſe thy ſtudy: hence thy pleaſures bring:
And drink large draughts of wiſdom from its ſpring;
That ſpring, whence perfect joy, and calm repoſe,
And bleſt content, and peace eternal, flows.
Obſerve how regular the Planets run,
In ſtated times, their courſes round the Sun.
Diff'rent their bulk, their diſtance, their career,
And diff'rent much the compaſs of their year:
Yet all the ſame eternal laws obey,
While God's unerring finger points the way.
Firſt Mercury, amidſt full tides of light,
Rolls next the ſun, through his ſmall circle bright.
All that dwell here muſt be refin'd and pure:
Bodies like ours ſuch ardour can't endure:
Our Earth would blaze beneath ſo fierce a ray,
And all its marble mountains melt away.
Fair Venus, next, fulfils her larger round,
With ſofter beams, and milder glory crown'd.
Friend to mankind, ſhe glitters from afar,
Now the bright ev'ning, now the morning ſtar.
More diſtant ſtill, our Earth comes rolling on,
And forms a wider circle round the ſun:
With her the Moon, companion ever dear!
Her courſe attending through the ſhining year.
See, Mars, alone, runs his appointed race,
And meaſures out, exact, the deſtin'd ſpace:
Nor nearer does he wind, nor farther ſtray,
But finds the point whence firſt he roll'd away.
More yet remote from day's all-cheering ſource,
Vaſt Jupiter performs his conſtant courſe:
Four friendly moons, with borrow'd luſtre, riſe,
Beſtow their beams benign, and light his ſkies.
Fartheſt and laſt, ſcarce warm'd by Phœbus' ray,
Through his vaſt orbit Saturn wheels away.
How great the change could we be wafted there!
How ſlow the ſeaſons! and how long the year!
One moon, on us, reflects its cheerful light:
There, five attendants brighten up the night.
Here, the blue firmament bedeck'd with ſtars,
There, over-head, a lucid arch appears,
From hence how large, how ſtrong, the ſun's bright ball!
But ſeen from thence, how languid and how ſmall!—
When the keen north with all its fury blows,
Congeals the floods, and forms the fleecy ſnows,
'Tis heat intenſe to what can there be known:
Warmer our poles than is its burning zone.
Who there inhabit muſt have other pow'rs,
Juices, and veins, and ſenſe, and life, than ours.
One moment's cold, like theirs, would pierce the bone,
Freeze the heart-blood, and turn us all to ſtone.
Strange and amazing muſt the diff'rence be,
'Twixt this dull Planet and bright Mercury:
Yet reaſon ſays, nor can we doubt at all,
Millions of beings dwell on either ball,
With conſtitutions fitted for that ſpot,
Where Providence, all-wiſe, has fix'd their lot.
Wond'rous art thou, O GOD, in all thy ways!
Their eyes to thee let all thy creatures raiſe;
Adore thy grandeur, and thy goodneſs praiſe.
Ye ſons of men! with ſatisfaction know,
God's own right hand diſpenſes all below:
Nor good nor evil does by chance befall;
He reigns ſupreme, and he directs it all.
At his command, affrighting human-kind,
Comets drag on their blazing lengths behind:
Nor, as we think, do they at random rove,
But, in determin'd times, through long ellipſes move.
And tho' ſometimes they near approach the ſun,
Sometimes beyond our ſyſtem's orbit run;
Throughout their race they act their Maker's will,
His pow'r declare, his purpoſes fulfil.

72. III. Of thoſe preceptive poems that treat of the buſineſs and pleaſures of mankind, Virgil's *Georgics* claims our firſt and principal attention. In theſe he has laid down the rules of huſbandry in all its branches with the utmoſt exactneſs and perſpicuity, and at the ſame time embelliſhed them with all the beauties and graces of poetry. Though his ſubject was huſbandry, he has delivered his precepts, as Mr Addiſon obſerves, not with the ſimplicity of a ploughman, but with the

addreſs of a poet: the meaneſt of his rules are laid down with a kind of grandeur; *and he breaks the clods, and toſſes about the dung, with an air of gracefulneſs.* Of the different ways of conveying the ſame truth to the mind, he takes that which is pleaſanteſt; and this chiefly diſtinguiſhes poetry from proſe, and renders Virgil's rules of huſbandry more delightful and valuable than any other.

Theſe poems, which are eſteemed the moſt perfect of the author's works, are, perhaps, the beſt that can be propoſed for the young ſtudent's imitation in this manner of writing; for the whole of his *Georgics* is wrought up with wonderful art, and decorated with all the flowers of poetry.

74. IV. Of thoſe poems which give precepts for the recreations and pleaſures of a country life, we have ſeveral in our own language that are juſtly admired. As the moſt conſiderable of thoſe diverſions, however, are finely treated by Mr Gay in his *Rural Sports*, we particularly refer to that poem.

We ſhould here treat of thoſe preceptive poems that teach the art of poetry itſelf, of which there are many that deſerve particular attention; but we have anticipated our deſign, and rendered any farther notice of them in a manner uſeleſs, by the obſervations we have made in the courſe of this treatiſe. We ought however to remark, that Horace was the only poet among the ancients who wrote precepts for poetry in verſe: at leaſt his epiſtle to the Piſos is the only piece of the kind that has been handed down to us; and that is ſo perfect, it ſeems almoſt to have precluded the neceſſity of any other. Among the moderns we have ſeveral that are juſtly admired; as Boileau, Pope, &c.

74. Poets who write in the preceptive manner ſhould take care to chooſe ſuch ſubjects as are worthy of their muſe, and of conſequence to all mankind; for to beſtow both parts and pains to teach people trifles that are unworthy of their attention, is to the laſt degree ridiculous.

Among poems of the uſeful and intereſting kind, Dr Armſtrong's *Art of Preſerving Health* deſerves particular recommendation, as well in conſideration of the ſubject, as of the elegant and maſterly manner in which he has treated it; for he has made thoſe things, which are in their own nature dry and unentertaining, perfectly agreeable and pleaſing, by adhering to the rules obſerved by Virgil and others, in the conduct of theſe poems.

Warton on Didactic Poetry.

75. With regard to the ſtyle or dreſs of theſe poems, it ſhould be ſo rich as to hide the nakedneſs of the ſubject, and the barrenneſs of the precepts ſhould be loſt in the luſtre of the language. "It ought to abound in the moſt bold and forcible metaphors, the moſt glowing and pictureſque epithets; it ought to be elevated and enlivened by pomp of numbers and majeſty of words, and by every figure that can lift a language above the vulgar and current expreſſions." One may add, that in no kind of poetry (not even in the ſublime ode) is beauty of expreſſion ſo much to be regarded as in this. For the epic writer ſhould be very cautious of indulging himſelf in too florid a manner of expreſſion, eſpecially in the dramatic parts of his fable, where he introduces dialogue: and the writer of tragedy cannot fall into ſo nauſeous and unnatural an affectation, as to put laboured deſcriptions, pompous epithets, ſtudied phraſes, and high-flown metaphors, into the mouths of his characters. But as the didactic poet ſpeaks in his own perſon, it is neceſſary and proper for him to uſe a brighter colouring of ſtyle, and to be more ſtudious of ornament. And this is agreeable to an admirable precept of Ariſtotle, which no writer ſhould ever forget,—"That diction ought moſt to be laboured in the unactive, that is, the deſcriptive, parts of a poem, in which the opinions, manners, and paſſions of men are not repreſented; for too glaring an expreſſion obſcures the manners and the ſentiments."

We have already obſerved that any thing in nature may be the ſubject of this poem. Some things however will appear to more advantage than others, as they give a greater latitude to genius, and admit of more poetical ornaments. Natural hiſtory and philoſophy are copious ſubjects. Precepts in theſe might be decorated with all the flowers in poetry; and, as Dr Trapp obſerves, how can poetry be better employed, or more agreeably to its nature and dignity, than in celebrating the works of the great Creator, and deſcribing the nature and generation of animals, vegetables, and minerals; the revolutions of the heavenly bodies; the motions of the earth; the flux and reflux of the ſea; the cauſe of thunder, lightning, and other meteors; the attraction of the magnet; the gravitation, coheſion, and repulſion of matter; the impulſive motion of light; the ſlow progreſſion of ſounds; and other amazing phenomena of nature. Moſt of the arts and ſciences are alſo proper ſubjects for this poem; and none are more ſo than its two ſiſter arts, painting and muſic. In the former, particularly, there is room for the moſt entertaining precepts concerning the diſpoſal of colours; the arrangement of lights and ſhades; the ſecret attractives of beauty; the various ideas which make up the one; the diſtinguiſhing between the attitudes proper to either ſex, and every paſſion; the repreſenting proſpects of buildings, battles, or the country; and laſtly, concerning the nature of imitation, and the power of painting. What a boundleſs field of invention is here? What room for deſcription, compariſon, and poetical fable? How eaſy the tranſition, at any time, from the draught to the original, from the ſhadow to the ſubſtance? and from hence, what noble excurſions may be made into hiſtory, into panegyric upon the greateſt beauties or heroes of the paſt or preſent age?

SECT. VII. *Of the Epiſtle.*

76. THIS ſpecies of writing, if we are permitted to lay down rules from the examples of our beſt poets, admits of great latitude, and ſolicits ornament and decoration: yet the poet is ſtill to conſider that the true character of the epiſtle is eaſe and elegance; nothing therefore ſhould be forced or unnatural, laboured, or affected, but every part of the compoſition breathe an eaſy, polite, and unconſtrained freedom.

It is ſuitable to every ſubject; for as the epiſtle takes place of diſcourſe, and is intended as a ſort of diſtant converſation, all the affairs of life and reſearches into nature may be introduced. Thoſe, however, which are fraught with compliment or condolence, that

Epiſtle.

contain a deſcription of places, or are full of pertinent remarks, and in a familiar and humorous way deſcribe the manners, vices, and follies of mankind, are the beſt; becauſe they are moſt ſuitable to the true character of epiſtolary writing, and (buſineſs ſet apart) are the uſual ſubjects upon which our letters are employed.

All farther rules and directions are unneceſſary; for this kind of writing is better learned by example and practice, than by precept. We ſhall therefore, in conformity to our plan, ſelect a few epiſtles for the reader's imitation; which, as this method of writing has of late much prevailed, may be beſt taken, perhaps, from our modern poets.

77. The following letter from Mr Addiſon to lord Halifax, contains an elegant deſcription of the curioſities and places about Rome, together with ſuch reflections on the ineſtimable bleſſings of liberty as muſt give pleaſure to every Briton, eſpecially when he ſees them thus placed in direct oppoſition to the baneful influence of ſlavery and oppreſſion which are ever to be ſeen among the miſerable inhabitants of thoſe countries.

While you, my lord, the rural ſhades admire,
And from Britannia's public poſts retire,
Nor longer, her ungrateful ſons to pleaſe,
For their advantage ſacrifice your eaſe;
Me into foreign realms my fate conveys,
Through nations fruitful of immortal lays,
Where the ſoft ſeaſon and inviting clime
Conſpire to trouble your repoſe with rhime.
For whereſoe'er I turn my raviſh'd eyes,
Gay gilded ſcenes and ſhining proſpects riſe,
Poetic fields encompaſs me around,
And ſtill I ſeem to tread on claſſic ground;
For here the muſe ſo oft her harp has ſtrung,
That not a mountain rears its head unſung,
Renown'd in verſe each ſhady thicket grows,
And ev'ry ſtream in heav'nly numbers flows.
How am I pleas'd to ſearch the hills and woods
For riſing ſprings and celebrated floods;
To view the Nar, tumultuous in his courſe,
And trace the ſmooth Clitumnus to his ſource;
To ſee the Mincio draw his wat'ry ſtore
Through the long windings of a fruitful ſhore,
And hoary Albula's infected tide
O'er the warm bed of ſmoking ſulphur glide!
Fir'd with a thouſand raptures, I ſurvey
Eridanus through flow'ry meadows ſtray,
The king of floods! that, rolling o'er the plains,
The tow'ring Alps of half their moiſture drains,
And, proudly ſwoln with a whole winter's ſnows,
Diſtributes wealth and plenty where he flows.
Sometimes, miſguided by the tuneful throng,
I look for ſtreams immortaliz'd in ſong,
That loſt in ſilence and oblivion lie,
(Dumb are their fountains and their channels dry)
Yet run for ever by the muſe's ſkill,
And in the ſmooth deſcription murmur ſtill.
Sometimes to gentle Tiber I retire,
And the fam'd river's empty ſhores admire,
That, deſtitute of ſtrength, derives its courſe
From thirſty urns, and an unfruitful ſource;

Epiſtle.

Yet ſung ſo often in poetic lays,
With ſcorn the Danube and the Nile ſurveys;
So high the deathleſs muſe exalts her theme!
Such was the Boyn, a poor inglorious ſtream,
That in Hibernian vales obſcurely ſtray'd,
And unobſerv'd in wild meanders play'd;
Till, by your lines and Naſſau's ſword renown'd,
Its riſing billows through the world reſound,
Where'er the hero's godlike acts can pierce,
Or where the fame of an immortal verſe.
Oh cou'd the muſe my raviſh'd breaſt inſpire
With warmth like yours, and raiſe an equal fire,
Unnumber'd beauties in my verſe ſhould ſhine,
And Virgil's Italy ſhould yield to mine!
See how the golden groves around me ſmile,
That ſhun the coaſts of Britain's ſtormy iſle,
Or when tranſplanted and preſerv'd with care,
Curſe the cold clime, and ſtarve in northern air.
Here kindly warmth their mounting juice ferments
To nobler taſtes, and more exalted ſcents:
Ev'n the rough rocks with tender myrtles bloom,
And trodden weeds ſend out a rich perfume.
Bear me, ſome god, to Baia's gentle ſeats,
Or cover me in Umbria's green retreats;
Where weſtern gales eternally reſide,
And all the ſeaſons laviſh all their pride:
Bloſſoms, and fruits, and flow'rs together riſe,
And the whole year in gay confuſion lies.
Immortal glories in my mind revive,
And in my ſoul a thouſand paſſions ſtrive,
When Rome's exalted beauties I deſcry
Magnificent in piles of ruin lie.
An amphitheatre's amazing height
Here fills my eye with terror and delight,
That on its public ſhows unpeopled Rome,
And held uncrowded nations in its womb:
Here pillars rough with ſculpture pierce the ſkies;
And here the proud triumphal arches riſe,
Where the old Romans deathleſs acts, diſplay'd,
Their baſe degenerate progeny upbraid:
Whole rivers here forſake the fields below,
And wond'ring at their height thro' airy channels flow.
Still to new ſcenes my wand'ring muſe retires;
And the dumb ſhow of breathing rocks admires;
Where the ſmooth chiſel all its force has ſhown,
And ſoften'd into fleſh the rugged ſtone.
In ſolemn ſilence, a majeſtic band,
Heroes, and gods, and Roman conſuls ſtand,
Stern tyrants, whom their cruelties renown,
And emperors in Parian marble frown;
While the bright dames, to whom they humbly ſu'd,
Still ſhow the charms that their proud hearts ſubdu'd.
Fain would I Raphael's godlike art rehearſe,
And ſhow th' immortal labours in my verſe,
Where from the mingled ſtrength of ſhade and light
A new creation riſes to my ſight,
Such heav'nly figures from his pencil flow,
So warm with life his blended colours glow.
From theme to theme with ſecret pleaſure toſt,
Amidſt the ſoft variety I'm loſt.
Here pleaſing airs my raviſh'd ſoul confound
With circling notes and labyrinths of ſound;
Here domes and temples riſe in diſtant views,
And opening palaces invite my muſe.

How has kind heav'n adorn'd the happy land,
And ſcatter'd bleſſings with a waſteful hand!
But what avail her unexhauſted ſtores,
Her blooming mountains, and her ſunny ſhores,
With all the gifts that heav'n and earth impart,
The ſmiles of nature, and the charms of art,
While proud oppreſſion in her valleys reigns,
And tyranny uſurps her happy plains?
The poor inhabitant beholds in vain
The red'ning orange and the ſwelling grain:
Joyleſs he ſees the growing oils and wines,
And in the myrtle's fragrant ſhade repines:
Starves, in the midſt of nature's bounty curſt,
And in the loaden vineyard dies for thirſt.
O liberty, thou goddeſs heav'nly bright,
Profuſe of bliſs, and pregnant with delight!
Eternal pleaſures in thy preſence reign,
And ſmiling plenty leads thy wanton train;
Eas'd of her load, ſubjection grows more light,
And poverty looks cheerful in thy ſight;
Thou mak'ſt the gloomy face of nature gay,
Giv'ſt beauty to the ſun, and pleaſure to the day.
Thee, goddeſs, thee, Britannia's iſle adores;
How has ſhe oft exhauſted all her ſtores,
How oft in fields of death thy preſence ſought,
Nor thinks the mighty prize too dearly bought!
On foreign mountains may the ſun refine
The grape's ſoft juice, and mellow it to wine,
With citron groves adorn a diſtant ſoil,
And the fat olive ſwell with floods of oil:
We envy not the warmer clime, that lies
In ten degrees of more indulgent ſkies,
Nor at the coarſeneſs of our heav'n repine,
Though o'er our heads the frozen pleiads ſhine:
'Tis liberty that crowns Britannia's iſle,
And makes her barren rocks and her bleak mountains ſmile.
Others with tow'ring piles may pleaſe the ſight,
And in their proud aſpiring domes delight;
A nicer touch to the ſtretch'd canvas give,
Or teach their animated rocks to live:
'Tis Britain's care to watch o'er Europe's fate,
And hold in balance each contending ſtate,
To threaten bold preſumptuous kings with war,
And anſwer her afflicted neighbour's pray'r.
The Dane and Swede, rous'd up by fierce alarms,
Bleſs the wiſe conduct of her pious arms:
Soon as her fleets appear, their terrors ceaſe,
And all the northern world lies huſh'd in peace.
Th' ambitious Gaul beholds with ſecret dread
Her thunder aim'd at his aſpiring head,
And fain her godlike ſons would diſunite
By foreign gold, or by domeſtic ſpite;
But ſtrives in vain to conquer or divide,
Whom Naſſau's arms defend and counſels guide.
Fir'd with the name, which I ſo oft have found
The diſtant climes and diff'rent tongues reſound,
I bridle in my ſtruggling muſe with pain,
That longs to lanch into a bolder ſtrain.
But I've already troubled you too long,
Nor dare attempt a more advent'rous ſong:
My humble verſe demands a ſofter theme,
A painted meadow, or a purling ſtream;
Unfit for heroes; whom immortal lays,
And lines like Virgil's, or like yours, ſhould praiſe.

78. There is a fine ſpirit of freedom, and love of liberty, diſplayed in the following letter from lord Lyttelton to Mr Pope; and the meſſage from the ſhade of Virgil, which is truly poetical, and juſtly preceptive, may prove an uſeful leſſon to future bards.

From Rome, 1730.

IMMORTAL bard! for whom each muſe has wove
The faireſt garlands of the Aonian grove;
Preſerv'd, our drooping genius to reſtore,
When Addiſon and Congreve are no more;
After ſo many ſtars extinct in night,
The darken'd age's laſt remaining light!
To thee from Latian realms this verſe is writ,
Inſpir'd by memory of ancient wit:
For now no more theſe climes their influence boaſt,
Fall'n is their glory, and their virtue loſt;
From tyrants, and from prieſts, the muſes fly,
Daughters of reaſon and of liberty.
Nor Baiæ now nor Umbria's plain they love,
Nor on the banks of Nar or Mincia rove;
To Thames's flow'ry borders they retire,
And kindle in thy breaſt the Roman fire.
So in the ſhades, where cheer'd with ſummer rays
Melodious linnets warbled ſprightly lays,
Soon as the faded, falling leaves complain
Of gloomy winter's unauſpicious reign,
No tuneful voice is heard of joy or love,
But mournful ſilence ſaddens all the grove.
Unhappy Italy! whoſe alter'd ſtate
Has felt the worſt ſeverity of fate:
Not that barbarian hands her faſces broke,
And bow'd her haughty neck beneath their yoke;
Nor that her palaces to earth are thrown,
Her cities deſert, and her fields unſown;
But that her ancient ſpirit is decay'd,
That ſacred wiſdom from her bounds is fled,
That there the ſource of ſcience flows no more,
Whence its rich ſtreams ſupply'd the world before.
Illuſtrious names! that once in Latium ſhin'd,
Born to inſtruct and to command mankind;
Chiefs, by whoſe virtue mighty Rome was rais'd,
And poets, who thoſe chiefs ſublimely prais'd!
Oft I the traces you have left explore,
Your aſhes viſit, and your urns adore;
Oft kiſs, with lips devout, ſome mould'ring ſtone,
With ivy's venerable ſhade o'ergrown;
Thoſe hallow'd ruins better pleas'd to ſee,
Than all the pomp of modern luxury.
As late on Virgil's tomb freſh flow'rs I ſtrow'd,
While with th' inſpiring muſe my boſom'd glow'd,
Crown'd with eternal bays, my raviſh'd eyes
Beheld the poet's awful form ariſe:
Stranger, he ſaid, whoſe pious hand has paid
Theſe grateful rites to my attentive ſhade,
When thou ſhalt breathe thy happy native air,
To Pope this meſſage from his maſter bear.
Great bard, whoſe numbers I myſelf inſpire,
To whom I gave my own harmonious lyre,
If high exalted on the throne of wit,
Near me and Homer thou aſpire to ſit,
No more let meaner ſatire dim the rays
That flow majeſtic from thy noble bays.
In all the flow'ry paths of Pindus ſtray:

But ſhun that thorny, that unpleaſing way;
Nor, when each ſoft engaging muſe is thine,
Addreſs the leaſt attractive of the nine.
Of thee more worthy were the taſk to raiſe
A laſting column to thy country's praiſe,
To ſing the land, which yet alone can boaſt
That liberty corrupted Rome has loſt;
Where ſcience in the arms of peace is laid,
And plants her palm beneath the olive's ſhade.
Such was the theme for which my lyre I ſtrung,
Such was the people whoſe exploits I ſung;
Brave, yet refin'd, for arms and arts renown'd,
With diff'rent bays by Mars and Phœbus crown'd,
Dauntleſs oppoſers oppoſers of tyrannic ſway,
But pleas'd a mild AUGUSTUS to obey.
If theſe commands ſubmiſſive thou receive,
Immortal and unblam'd thy name ſhall live;
Envy to black Cocytus ſhall retire,
And howl with furies in tormenting fire;
Approving time ſhall conſecrate thy lays,
And join the patriot's to the poet's praiſe.

79. The great uſe of medals is properly deſcribed in the enſuing elegant epiſtle from Mr Pope to Mr Addiſon; and the extravagant paſſion which ſome people entertain only for the colour of them, is very agreeably and very juſtly ridiculed.

SEE the wild waſte of all devouring years!
How Rome her own ſad ſepulchre appears!
With nodding arches, broken temples ſpread!
The very tombs now vaniſh like their dead!
Imperial wonders rais'd on nations ſpoil'd,
Where mix'd with ſlaves the groaning martyr toil'd!
Huge theatres, that now unpeopled woods,
Now drain'd a diſtant country of her floods!
Fanes, which admiring gods with pride ſurvey,
Statues of men, ſcarce leſs alive than they!
Some felt the ſilent ſtroke of mould'ring age,
Some hoſtile fury, ſome religious rage;
Barbarian blindneſs, Chriſtian zeal conſpire,
And Papal piety, and Gothic fire.
Perhaps, by its own ruin ſav'd from flame,
Some bury'd marble half preſerves a name;
That name the learn'd with fierce diſputes purſue,
And give to Titus old Veſpaſian's due.
Ambition ſigh'd: She found it vain to truſt
The faithleſs column and the crumbling buſt;
Huge moles, whoſe ſhadow ſtretch'd from ſhore to ſhore,
Their ruins periſh'd, and their place no more!
Convinc'd, ſhe now contracts her vaſt deſign,
And all her triumphs ſhrinks into a coin.
A narrow orb each crowded conqueſt keeps,
Beneath her palm here ſad Judæa weeps;
Now ſcantier limits the proud arch confine,
And ſcarce are ſeen the proſtrate Nile or Rhine;
A ſmall Euphrates through the piece is roll'd,
And little eagles waves their wings in gold.
The medal, faithful to its charge of fame.
Through climes and ages bears each form and name:
In one ſhort view ſubjected to our eye,
Gods, emp'rors, heroes, ſages, beauties, lie.
With ſharpen'd ſight pale antiquaries pore,
The inſcription value, but the ruſt adore.
This the blue varniſh, that the green endears,
The ſacred ruſt of twice ten hundred years!
To gain Preſcennius one employs his ſchemes,
One graſps a Cecrops in ecſtatic dreams.
Poor Vadius, long, with learned ſpleen devour'd,
Can taſte no pleaſure ſince his ſhield was ſcour'd:
And Curio, reſtleſs by the fair one's ſide,
Sighs for an Otho, and neglects his bride.
Theirs is the vanity, the learning thine:
Touch'd by thy hand, again Rome's glories ſhine;
Her gods and god-like heroes riſe to view,
And all her faded garlands bloom anew.
Nor bluſh theſe ſtudies thy regard engage;
Theſe pleas'd the fathers of poetic rage;
The verſe and ſculpture bore an equal part,
And art reflected images to art.
Oh when ſhall Britain, conſcious of her claim,
Stand emulous of Greek and Roman fame?
In living medals ſee her wars enroll'd,
And vanquiſh'd realms ſupply recording gold?
Here, riſing bold, the patriot's honeſt face;
There, warriors frowning in hiſtoric braſs?
Then future ages with delight ſhall ſee
How Plato's, Bacon's, Newton's looks agree;
Or in fair ſeries laurell'd bards be ſhown,
A Virgil there, and here an Addiſon.
Then ſhall thy CRAGGS (and let me call him mine)
On the caſt ore, another Pollio ſhine;
With aſpect open ſhall erect his head,
And round the orb in laſting notes be read,
" Stateſman, yet friend to truth! of ſoul ſincere,
" In action faithful, and in honour clear;
" Who broke no promiſe, ſerv'd no private end,
" Who gain'd no title, and who loſt no friend;
" Ennobled by himſelf, by all approv'd,
" Prais'd, wept, and honour'd, by the muſe he lov'd.

80. The following letter from Mr Philips to the earl of Dorſet is entirely deſcriptive; but is one of thoſe deſcriptions which will be ever read with delight.

Copenhagen, March 9. 1709.

FROM frozen climes, and endleſs tracts of ſnow,
From ſtreams which northern winds forbid to flow,
What preſent ſhall the muſe to Dorſet bring,
Or how, ſo near the pole, attempt to ſing?
The hoary winter here conceals from ſight
All pleaſing objects which to verſe invite.
The hills and dales, and the delightful woods,
The flow'ry plains, and ſilver ſtreaming floods,
By ſnow diſguis'd, in bright confuſion lie,
And with one dazzling waſte fatigue the eye.
No gentle breathing breeze prepares the ſpring,
No birds within the deſert region ſing:
The ſhips, unmov'd, the boiſt'rous winds defy,
While rattling chariots o'er the ocean fly.
The vaſt Leviathan wants room to play,
And ſpout his waters in the face of day;
The ſtarving wolves along the main ſea ſprowl,
And to the moon in icy valleys howl.
O'er many a ſhining league the level main
Here ſpreads itſelf into a glaſſy plain:

There ſolid billows of enormous ſize,
Alps of green ice, in wild diſorder riſe.
And yet but lately have I ſeen, ev'n here,
The winter in a lovely dreſs appear.
'E're yet the clouds let fall the treaſur'd ſnow,
Or winds begin through hazy ſkies to blow,
At ev'ning a keen eaſtern breeze aroſe,
And the deſcending rain unſully'd froze;
Soon as the ſilent ſhades of night withdrew,
The ruddy morn diſclos'd at once to view
The face of nature in a rich diſguiſe,
And brighten'd ev'ry object to my eyes:
For ev'ry ſhrub, and ev'ry blade of graſs,
And ev'ry pointed thorn, ſeem'd wrought in glaſs;
In pearls and rubies rich the hawthorns ſhow,
While through the ice the crimſon berries glow.
The thick-ſprung reeds, which watery marſhes yield,
Seem'd poliſh'd lances in a hoſtile field.
The ſtag in limpid currents with ſurpriſe,
Sees cryſtal branches on his forehead riſe:
The ſpreading oak, the beech, and tow'ring pine,
Glaz'd over, in the freezing æther ſhine.
The frighted birds the rattling branches ſhun,
Which wave and glitter in the diſtant ſun.
  When if a ſudden guſt of wind ariſe,
The brittle foreſt into atoms flies,
The crackling woods beneath the tempeſt bends,
And in a ſpangled ſhower the proſpect ends:
Or, if a ſouthern gale the region warm,
And by degrees unbend the wint'ry charm,
The traveller a miry country ſees,
And journey ſad beneath the dropping trees:
Like ſome deluded peaſant Merlin leads
Through fragrant bow'rs and through delicious meads,
While here enchanted gardens to him riſe,
And airy fabrics there attract his eyes,
His wandering feet the magic paths purſue,
And while he thinks the fair illuſion true,
The trackleſs ſcenes diſperſe in fluid air,
And woods, and wilds, and thorny ways appear,
A tedious road the weary wretch returns,
And, as he goes, the tranſient viſion mourns.

81. We have already obſerved that the eſſential, and indeed the true characteriſtic of epiſtolary writing is eaſe; and on this account, as well as others, the following letter from Mr Pope to Miſs Blount is to be admired.

To Miſs BLOUNT, *on her leaving the Town after the Coronation.*

As ſome fond virgin, whom her mother's care
Drags from the town to wholeſome country air;
Juſt when ſhe learns to roll a melting eye,
And hear a ſpark, yet think no danger nigh;
From the dear man unwilling ſhe muſt ſever,
Yet takes one kiſs before ſhe parts for ever:
Thus from the world fair Zephalinda flew,
Saw others happy, and with ſighs withdrew:
Not that their pleaſures caus'd her diſcontent;
She ſigh'd not that they ſtay'd, but that ſhe went.
  She went, to plain-work, and to purling brooks,
Old-faſhion'd halls, dull aunts, and croaking rooks:
She went from op'ra, park, aſſembly, play,
To morning-walks, and pray'rs three hours a-day;
To part her time 'twixt reading and bohea,
To muſe, and ſpill her ſolitary tea,
Or o'er cold coffee trifle with the ſpoon,
Count the ſlow clock, and dine exact at noon;
Divert her eyes with pictures in the fire,
Hum half a tune, tell ſtories to the 'ſquire;
Up to her godly garret after ſeven,
There ſtarve and pray, for that's the way to heav'n.
  Some 'ſquire, perhaps, you take delight to rack;
Whoſe game is whiſk, whoſe treat's a toaſt in ſack;
Who viſits with a gun, preſents you birds,
Then gives a ſmacking buſs, and cries,—no words!
Or with his hound comes hollowing from the ſtable,
Makes love with nods, and knees beneath a table;
Whoſe laughs are hearty, tho' his jeſts are coarſe,
And loves you beſt of all things—but his horſe.
  In ſome fair ev'ning, on your elbow laid,
You dream of triumphs in the rural ſhade;
In penſive thought recall the fancy'd ſcene,
See coronations riſe on every green;
Before you paſs th' imaginary ſights
Of lords and earls, and dukes, and garter'd knights,
While the ſpread fan o'er-ſhades your cloſing eyes;
Then give one flirt, and all the viſion flies.
Thus vaniſh ſceptres, coronets and balls,
And leave you in lone woods, or empty walls!
  So when your ſlave, at ſome dear idle time,
(Not plagu'd with head-achs, or the want of rhyme)
Stands in the ſtreets, abſtracted from the crew,
And while he ſeems to ſtudy, thinks of you;
Juſt when his fancy points your ſprightly eyes,
Or ſees the bluſh of ſoft Parthenia riſe,
Gay pats my ſhoulder, and you vaniſh quite,
Streets, chairs, and coxcombs, ruſh upon my ſight;
Vex'd to be ſtill in town, I knit my brow,
Look ſour, and hum a tune, as you may now.

SECT. VII. *Of Deſcriptive Poetry.*

82. DESCRIPTIVE poetry is of unverſal uſe, ſince there is nothing in nature but what may be deſcribed. As poems of this kind, however, are intended more to delight than to inſtruct, great care ſhould be taken to make them agreeable. Deſcriptive poems are made beautiful by ſimilies properly induced, images of feigned perſons, and alluſions to ancient fables or hiſtorical facts; as will appear by a peruſal of the beſt of theſe poems, eſpecially Milton's *L' Allegro* and *Il Penſeroſo*, Denham's *Cooper Hill*, and Pope's *Windſor Foreſt*. Every body being in poſſeſſion of Milton's works, we forbear inſerting the two former; and the others are two long for our purpoſe. That inimitable poem, *The Seaſons*, by Mr Thomſon, notwithſtanding ſome parts of it are didactic, may be alſo with propriety referred to this head.

SECT. VIII. *Of Allegorical Poetry.*

83. COULD truth engage the affections of mankind in her native and ſimple dreſs, ſhe would require no ornament, or aid, from the imagination; but her delicate light, though lovely in itſelf, and dear to the moſt diſcerning, does not ſtrike the ſenſes of the multitude ſo as to ſecure their eſteem and attention: the poet therefore dreſſed her up in the manner in which

they thought ſhe would appear the moſt amiable, and called in allegories and airy diſguiſes as her auxiliaries in the cauſe of virtue.

An allegory is a fable, or ſtory, in which, under the diſguiſe of imaginary perſons or things, ſome real action or inſtructive moral is conveyed to the mind. Every allegory therefore has two ſenſes, the one literal and the other myſtical; the firſt has been aptly enough compared to a dream, or viſion, of which the laſt is the true meaning or interpretation.

From this definition of allegorical poetry the reader will perceive that it gives great latitude to genius, and affords ſuch a boundleſs ſcope for invention, that the poet is allowed to ſoar beyond all creation; to give life and action to virtues, vices, paſſions, diſeaſes, and natural and moral qualities; to raiſe floating iſlands, enchanted palaces, caſtles, &c. and to people them with the creatures of his own imagination.

The poet's eye, in a fine frenzy rolling,
Doth glance from heav'n to earth, from earth to heav'n;
And, as imagination bodies forth
The forms of things unknown, the poet's pen
Turns them to ſhape, and gives to airy nothing
A local habitation and a name. SHAKESPEARE.

But whatever is thus raiſed by the magic of his mind muſt be viſionary and typical, and the myſtical ſenſe appear obvious to the reader, and inculcate ſome moral or uſeful leſſon in life; otherwiſe the whole will be deemed rather the effects of a diſtempered brain, than the productions of real wit and genius. The poet, like Jaſon, may ſail to parts unexplored, but will meet with no applauſe if he returns without a golden fleece; for theſe romantic reveries would be unpardonable but for the myſtical meaning and moral that is thus artfully and agreeably conveyed with them, and on which account only the allegory is indulged with a greater liberty than any other ſort of writing.

The ancients juſtly conſidered this ſort of allegory as the moſt eſſential part of poetry; for the power of raiſing images of things not in being, giving them a ſort of life and action, and preſenting them, as it were, before the eyes, was thought to have ſomething in it like creation: but then, in ſuch compoſitions, they always expected to find a meaning couched under them of conſequence; and we may reaſonably conclude, that the allegories of their poets would never have been handed down to us, had they been deficient in this reſpect.

84. As the *fable* is the part immediately offered to the reader's conſideration, and intended as an agreeable vehicle to convey the moral, it ought to be bold, lively, and ſurpriſing, that it may excite curioſity and ſupport attention; for if the fable be ſpiritleſs and barren of invention, the attention will be diſengaged, and the moral, however uſeful and important in itſelf, will be little regarded.

There muſt likewiſe be a juſtneſs and propriety in the fable, that is, it muſt be cloſely connected with the ſubject on which it is employed; for notwithſtanding the boundleſs compaſs allowed the imagination in theſe writings, nothing abſurd, or uſeleſs, is to be introduced. In epic poetry ſome things may perhaps be admitted for no other reaſon but to ſurprize, and to raiſe what is called the *wonderful*, which is as neceſſary to the epic as the *probable;* but in allegories, however wild and extravagant the fable and the perſons introduced, each muſt correſpond with the ſubject they are applied to, and, like the members of a well-written ſimile, bear a due proportion and relation to each other: for we are to conſider, that the allegory is a ſort of extended or rather multiplied ſimile, and therefore, like that, ſhould never loſe the ſubject it is intended to illuſtrate. Whence it will appear, that genius and fancy are here inſufficient without the aid of taſte and judgment: theſe firſt, indeed, may produce a multitude of ornaments, a wilderneſs of ſweets; but the laſt muſt be employed to accommodate them to reaſon, and to arrange them ſo as to produce pleaſure and profit.

But it is not ſufficient that the fable be correſpondent with the ſubject, and have the properties above-deſcribed; for it muſt alſo be conſiſtent with itſelf. The poet may invent what ſtory he pleaſes, and form any imaginary beings that his fancy ſhall ſuggeſt; but here, as in dramatic writings, when perſons are once introduced, they muſt be ſupported to the end, and all ſpeak and act in character: for notwithſtanding the general licence here allowed, ſome order muſt be obſerved; and however wild and extravagant the characters, they ſhould not be abſurd. To this let me add, that the whole muſt be clear and intelligible; for the "fable (as Mr Hughes obſerves) being deſigned only to clothe and adorn the moral, but not to hide it, ſhould reſemble the draperies we admire in ſome of the ancient ſtatues, in which the folds are not too many nor too thick, but ſo judiciouſly ordered, that the ſhape and beauty of the limbs may be ſeen through them."—But this will more obviouſly appear from a peruſal of the beſt compoſitions of this claſs; ſuch as Spenſer's Fairy Queen, Thomſon's Caſtle of Indolence, Addiſon and Johnſon's beautiful allegories in the Spectator and Rambler, &c. &c.

85. The word *allegory* has been uſed in a more extenſive ſenſe than that in which we have here applied it: for all writings, where the moral is conveyed under the cover of borrowed characters and actions, by which other characters and actions (that are real) are repreſented, have obtained the name of *allegories;* though the fable or ſtory coutains nothing that is viſionary or romantic, but is made up of real or hiſtorical perſons, and of actions either probable or poſſible. But theſe writings ſhould undoubtedly be diſtinguiſhed by ſome other name, becauſe the literal ſenſe is conſiſtent with right reaſon, and may convey an uſeful moral, and ſatisfy the reader, without putting him under the neceſſity of ſeeking for another.

Some of the ancient critics, as Mr Addiſon obſerves, were fond of giving the works of their poets this ſecond or concealed meaning, though there was no apparent neceſſity for the attempt, and often but little ſhow of reaſon in the application. Thus the Iliad and Odyſſey of Homer are ſaid to be fables of this kind, and that the gods and heroes introduced are only the affections of the mind repreſented in a viſible ſhape and character. They tell us, ſays he, that Achilles in the firſt Iliad repreſents anger, or the irraſcible part of human nature: that upon drawing his ſword againſt his ſuperior, in a full aſſembly, Pallas (which, ſay they, is another name for reaſon) checks and adviſes him on the occaſion, and, at her firſt appearance, touches him upon the head; that part of the man being looked upon as the ſeat of reaſon. In this ſenſe, as Mr Hughes has well obſerved, the whole Æneis of Virgil may be ſaid to be an allegory, if you ſuppoſe Æneas to repreſent Auguſtus Cæſar, and that his conducting the remains of his countrymen from the ruins of Troy, to a new ſettlement in Italy, is an emblem of Auguſtus's forming a new government out of the ruins of the ariſtocracy, and eſtabliſhing the Romans, after the confuſion of the civil war, in a peaceable and flouriſhing condition. However ingenious this coincidence may appear, and whatever deſign Virgil had in view, he has avoided a particular and direct application, and ſo conducted his poem, that it is perfect without any allegorical interpretation; for whether we conſider Æneas or Auguſtus as the hero, the morals contained are equally inſtructive. And indeed it ſeems abſurd to ſuppoſe, that becauſe the epic poets have introduced ſome allegories into their works, every thing is to be underſtood in a myſtical manner, where the ſenſe is plain and evident without any ſuch application. Nor is the attempt that Taſſo made to turn his Jeruſalem into a myſtery, any particular recommendation of the work: for notwithſtanding he tells us, in what is called the *allegory*, printed with it, that the Chriſtian army repreſents man, the city of Jeruſalem civil happineſs, Godfrey the underſtanding, Rinaldo and Tancred the other powers of the ſoul, and that the body is typified by the common ſoldiers, and the like; yet the reader will find himſelf as little delighted as edified by the explication: for the mind has little pleaſure in an allegory that cannot be opened without a key made by the hand of the ſame artiſt; and indeed every allegory that is ſo dark, and, as it were, inexplicable, loſes its very eſſence, and becomes an enigma, or riddle, that is left to be interpreted by every crude imagination.

This laſt ſpecies of writing, whether called an *allegory*, or by any other name, is not leſs eminent and uſeful; for the introducing of real or hiſtorical perſons may not abridge or leſſen either our entertainment or inſtruction. In theſe compoſitions we often meet with an uncommon moral conveyed by the fable in a new and entertaining manner; or with a known truth ſo artfully decorated, and placed in ſuch a new and beautiful light, that we are amazed how any thing ſo charming and uſeful ſhould ſo long have eſcaped our obſervation. Such, for example, are many of Johnſon's pieces publiſhed in the Rambler under the title of *Eaſtern Stories*, and by Hawkeſworth in the Adventurer.

The ancient parables are of this ſpecies of writing: and it is to be obſerved, that thoſe in the New Teſtament have a moſt remarkable elegance and propriety; and are the more ſtriking, and the more inſtructive, for being drawn from objects that are familiar.—The more ſtriking, becauſe, as the things are ſeen, the moral conveyed becomes the object of our ſenſes, and requires little or no reflection:—the more inſtructive, becauſe every time they are ſeen, the memory is awakened, and the ſame moral is again exhibited with pleaſure to the mind, and accuſtoms it to reaſon and dwell on the ſubject. So that this method of inſtruction improves nature, as it were, into a book of life; ſince every thing before us may be ſo managed, as to give leſſons for our advantage. Our Saviour's parables of the ſower and the ſeed, of the tares, of the muſtard-ſeed, and of the leaven (Matthew xiii.), are all of this kind, and were obviouſly taken from the harveſt juſt ripening before him; for *his diſciples plucked the ears of corn and did eat, rubbing them in their hands.* See the articles ALLEGORY, and METAPHOR *and Allegory*, in the general alphabet.

SECT. VIII. *Of Fables.*

1. No method of inſtruction has been more ancient, more univerſal, and probably none more effectual, than that by apologue or fable. In the firſt ages, amongſt a rude and fierce people, this perhaps was the only method that would have been borne; and even ſince the progreſs of learning has furniſhed other helps, the fable, which at firſt was uſed through neceſſity, is retained from choice, on account of the elegant happineſs of its manner, and the refined addreſs with which, when well conducted, it inſinuates its moral.

2. As to the actors in this little drama, the fabuliſt has authority to preſs into his ſervice every kind of exiſtence under heaven; not only beaſts, birds, inſects, and all the animal creation; but flowers, ſhrubs, trees, and all the tribe of vegetables. Even mountains, foſſils, minerals, and the inanimate works of nature, diſcourſe articulately at his command, and act the part which he aſſigns them. The virtues, vices, and every property of beings, receive from him a local habitation and a name. In ſhort, he may perſonify, beſtow life, ſpeech, and action, on whatever he thinks proper.

It is eaſy to imagine what a ſource of novelty and variety this muſt open to a genius capable of conceiving and of employing theſe ideal perſons in a proper manner: what an opportunity it affords him to diverſify his images, and to treat the fancy with changes of objects, while he ſtrengthens the underſtanding, or regulates the paſſions, by a ſucceſſion of truths. To raiſe beings like theſe into a ſtate of action and intelligence, gives the fabuliſt an undoubted claim to that firſt character of the poet, a *creator*.

When theſe perſons are once raiſed, we muſt carefully enjoin them proper taſks, and aſſign them ſentiments and language ſuitable to their ſeveral natures and reſpective properties. A raven ſhould not be extolled for her voice, nor a bear be repreſented with an elegant ſhape. It were a very obvious inſtance of abſurdity, to paint a hare cruel, or a wolf compaſſionate. An aſs were but ill qualified to be general of an army, though he may well enough ſerve, perhaps, for one of the trumpeters. But ſo long as popular opinion allows to the lion magnanimity, rage to the tiger, ſtrength to the mule, cunning to the fox, and buffoonery to the monkey; why may not they ſupport the characters of an Agamemnon, Achilles, Ajax, Ulyſſes, and Therſites? The truth is, when moral actions are with judgment attributed to the brute creation, we ſcarce perceive that nature is at all violated by the fabuliſt. He appears at moſt to have only tranſlated their language. His lions, wolves, and foxes, behave and argue as thoſe creatures would, had they originally been endowed with the human faculties of ſpeech and reaſon.

But greater art is yet required whenever we perſonify inanimate beings. Here the copy ſo far deviates from the great lines of nature, that, without the niceſt care, reaſon will revolt againſt the fiction. However, beings of this ſort, managed ingeniouſly and with addreſs, recommend the fabuliſt's invention by the grace of novelty and of variety. Indeed the analogy between things natural and artificial, animate and inanimate, is often ſo very ſtriking, that we can, with ſeeming propriety, give paſſions and ſentiments to every individual part of exiſtence. Appearance favours the deception. The vine may be enamoured of the elm; her embraces teſtify her paſſion. The ſwelling mountain may, naturally enough, be delivered of a mouſe. The gourd may reproach the pine, and the ſky-rocket inſult the ſtars. The axe may ſolicit a new handle of the foreſt; and the moon, in her female character, requeſt a faſhionable garment. Here is nothing incongruous; nothing that ſhocks the reader with impropriety. On the other hand, were the axe to deſire a periwig, and the moon petition for a new pair of boots, probability would then be violated, and the abſurdity become too glaring.

3. The moſt beautiful fables that ever were invented, may be diſfigured by the language in which they are cloathed. Of this poor Æſop, in ſome of his Engliſh dreſſes, affords a melancholy proof. The ordinary ſtyle of fable ſhould be familiar, but alſo elegant.

The familiar, ſays Mr La Motte, is the general tone or accent of fable. It was thought ſufficient, on its firſt appearance, to lend the animals our moſt common language. Nor indeed have they any extraordinary pretenſions to the ſublime; it being requiſite they ſhould ſpeak with the ſame ſimplicity that they behave.

The familiar alſo is more proper for inſinuation than the elevated; this being the language of reflection, as the former is the voice of ſentiment. We guard ourſelves againſt the one, but lie open to the other; and inſtruction will always the moſt effectually ſway us, when it appears leaſt jealous of its rights and privileges.

The familiar ſtyle, however, that is here required, notwithſtanding that appearance of eaſe which is its character, is perhaps more difficult to write than the more elevated or ſublime. A writer more readily perceives when he has riſen above the common language, than he perceives, in ſpeaking this language, whether he has made the choice that is moſt ſuitable to the occaſion: and it is, nevertheleſs, upon this happy choice depends all the charms of the familiar. Moreover, the elevated ſtyle deceives and ſeduces, although it be not the beſt choſen; whereas the familiar can procure itſelf no ſort of reſpect, if it be not eaſy, natural, juſt, delicate, and unaffected. A fabuliſt muſt therefore beſtow great attention upon his ſtyle; and even labour it ſo much the more, that it may appear to have coſt him no pains at all.

The authority of Fontaine juſtify theſe opinions in regard to ſtyle. His fables are perhaps the beſt examples of the genteel familiar, as Sir Roger L'Eſtrange affords the groſſeſt of the indelicate and low. When we read, that "while the frog and the mouſe were diſputing it at ſwords-point, down comes a kite powdering upon them in the interim, and gobbets up both together to part the fray." And "where the fox reproaches a bevy of jolly goſſipping wenches making merry over a diſh of pullets, that if he but peeped into a hen-rooſt, they always made a bawling with their dogs and their baſtards; while you yourſelves (ſays he) can lie ſtuffing your guts with your hens and capons, and not a word of the pudding." This may be familiar; but it is alſo coarſe and vulgar, and cannot fail to diſguſt a reader that has the leaſt degree of taſte or delicacy.

The ſtyle of fable then muſt be ſimple and familiar; and it muſt likewiſe be correct and elegant. By the former, we mean, that it ſhould not be loaded with figure and metaphor; that the diſpoſition of words be natural, the turn of ſentences eaſy, and their conſtruction unembarraſſed. By elegance, we would exclude all coarſe and provincial terms; all affected and peurile conceits; all obſolete and pedantic phraſes. To this we would adjoin, as the word perhaps implies, a certain finiſhing poliſh, which gives a grace and ſpirit to the whole; and which, though it have always the appearance of nature, is almoſt ever the effect of art.

But notwithſtanding all that has been ſaid, there are ſome occaſions on which it is allowable, and even expedient, to change the ſtyle. The language of a fable muſt riſe or fall in conformity to the ſubject. A lion, when introduced in his regal capacity, muſt hold diſcourſe in a ſtrain ſomewhat more elevated than a country-mouſe. The lioneſs then becomes his queen, and the beaſts of the foreſt are called his ſubjects: a method that offers at once to the imagination both the animal and the perſon he is deſigned to repreſent. Again, the buffoon-monkey ſhould avoid that pomp of phraſe, which the owl employs as her beſt pretence to wiſdom. Unleſs the ſtyle be thus judiciouſly varied, it will be impoſſible to preſerve a juſt diſtinction of character.

Deſcriptions, at once conciſe and pertinent, add a grace to fable; but are then moſt happy when included in the action: whereof the fable of Boreas and the Sun affords us an example. An epithet well choſen is often a deſcription in itſelf; and ſo much the more agreeable, as it the leſs retards us in our purſuit of the cataſtrophe.

Laſtly, little ſtrokes of humour when ariſing naturally from the ſubject, and incidental reflections when kept in due ſubordination to the principal, add a value to theſe compoſitions. Theſe latter, however, ſhould be employed very ſparingly, and with great addreſs; be very few, and very ſhort: it is ſcarely enough that they naturally ſpring out of the ſubject; they ſhould be ſuch as to appear neceſſary and eſſential parts of the fable. And when theſe embelliſhments, pleaſing in themſelves, tend to illuſtrate the main action, they then afford that nameleſs grace remarkable in Fontaine and ſome few others, and which perſons of the beſt diſcernment will more eaſily conceive than they can explain.

SECT. IX. *Of Satire.*

88. THIS kind of poem is of very ancient date, and (if we believe Horace) was introduced, by way of interlude, by the Greek dramatic poets in their tragedies, to relieve the audience, and take off the

force of thoſe ſtrokes which they thought too deep and affecting. In thoſe ſatirical interludes, the ſcene was laid in the country; and the perſons were rural deities, ſatyrs, country peaſants, and other ruſtics.

> The firſt Tragedians found that ſerious ſtyle
> Too grave for their uncultivated age,
> And ſo brought wild and naked Satyrs in,
> (Whoſe motion, words, and ſhape, were all a farce)
> As oft as decency wou'd give them leave;
> Becauſe the mad, ungovernable rout,
> Full of confuſion and the fumes of wine,
> Lov'd ſuch variety and antic tricks.
> ROSCOMMON's *Horace.*

The ſatire we now have is generally allowed to be of Roman invention. It was firſt introduced without the decorations of ſcenes and action; but written in verſes of different meaſures by Ennius, and afterwards moulded into the form we now have it by Lucilius, whom Horace has imitated, and mentions with eſteem. This is the opinion of moſt of the critics, and particularly of Boileau, who ſays,

> Lucilius led the way, and, bravely bold,
> To Roman vices did the mirror hold;
> Protected humble goodneſs from reproach,
> Show'd worth on foot, and raſcals in a coach.
> Horace his pleaſing wit to this did add,
> That none, uncenſur'd, might be fools or mad:
> And Juvenal, with rhetorician's rage,
> Scourg'd the rank vices of a wicked age;
> Tho' horrid truths thro' all his labours ſhine,
> In what he writes there's ſomething of divine.

89. Our ſatire, therefore, may be diſtinguiſhed into two kinds; the *jocoſe*, or that which makes ſport with vice and folly, and ſets them up to ridicule; and the *ſerious*, or that which deals in aſperity, and is ſevere and acrimonious. Horace is a perfect maſter of the firſt, and Juvenal much admired for the laſt. The one is facetious, and ſmiles: the other is angry, and ſtorms. The foibles of mankind are the object of one; but crimes of a deeper dye have engaged the other. They both agree, however, in being pungent and biting: and from a due conſideration of the writings of theſe authors, who are our maſters in this art, we may define ſatire to be, A free, (and often jocoſe), witty, and ſharp poem, wherein the follies and vices of men are laſhed and ridiculed in order to their reformation. Its ſubject is whatever deſerves our contempt or abhorrence, (including every thing that is ridiculous and abſurd, or ſcandalous and repugnant to the golden precepts of religion and virtue.) Its manner is *invective*; and its end, *ſhame*. So that ſatire may be looked upon as the phyſician of a diſtempered mind, which it endeavours to cure by bitter and unſavoury, or by pleaſant and ſalutary applications.

90. A good ſatiriſt ought to be a man of wit and addreſs, ſagacity and eloquence. He ſhould alſo have a great deal of good-nature, as all the ſentiments which are beautiful in this way of writing muſt proceed from that quality in the author. It is good-nature produces that diſdain of all baſeneſs, vice, and folly, which prompts the poet to expreſs himſelf with ſuch ſmartneſs againſt the errors of men, but without bitterneſs to their perſons. It is this quality that keeps the mind even, and never lets an offence unſeaſonably throw the ſatiriſt out of his character.

61. In writing ſatire, care ſhould be taken that it be true and general; that is, levelled at abuſes in which numbers are concerned: for the perſonal kind of ſatire, or lampoon, which expoſes particular characters, and affects the reputation of thoſe at whom it is pointed, is ſcarce to be diſtinguiſhed from ſcandal and defamation. The poet alſo, whilſt he is endeavouring to correct the guilty, muſt take care not to uſe ſuch expreſſions as may corrupt the innocent: he muſt therefore avoid all obſcene words, and images that tend to debaſe and miſlead the mind. Horace and Juvenal, the chief ſatiriſts among the Romans, are faulty in this reſpect, and ought to be read with caution.

92. The ſtyle proper for ſatire is ſometimes grave and animated, inveighing againſt vice with warmth and earneſtneſs; but that which is pleaſant, ſportive, and, with becoming raillery, banters men out of their bad diſpoſitions, has generally the beſt effect, as it ſeems only to play with their follies, though it omits no opportunity of making them feel the laſh. The verſes ſhould be ſmooth and flowing, and the language manly, juſt, and decent.

> Of well-choſe words ſome take not care enough,
> And think they ſhould be as the ſubject rough:
> But ſatire muſt be more exactly made,
> And ſharpeſt thoughts in ſmootheſt words convey'd.
> Duke of *Bucks*'s ESSAY.

93. Satires, either of the *jocoſe* or *ſerious* kind, may be written in the epiſtolary manner, or by way of dialogue. Horace, Juvenal, and Perſius, have given us examples of both. Nay, ſome of Horace's ſatires may, without incongruity, be called *epiſtles*, and his epiſtles *ſatires*. But this is obvious to every reader.

Of the facetious kind, the ſecond ſatire of the ſecond book of Horace imitated by Mr Pope, and Swift's verſes on his own death, may be referred to as examples.

As to thoſe ſatires of the ſerious kind, for which Juvenal is ſo much diſtinguiſhed, the characteriſtic properties of which are, morality, dignity, and ſeverity; a better example cannot be mentioned than a poem entitled *London*, written in imitation of the third ſatire of Juvenal, by Mr Samuel Johnſon, who has kept up to the ſpirit and force of the original.

Nor muſt we omit to mention Dr Young's *Love of Fame the Univerſal Paſſion*, in ſeven ſatires; which, though characteriſtical, abound with morality and good ſenſe. The characters are well ſelected, the ridicule is high, and the ſatire well pointed and to the purpoſe.

94. We have already obſerved, that perſonal ſatire approaches too near defamation, to deſerve any countenance or encouragement. Dryden's *Mack Flecknoe* is for this reaſon exceptionable, but as a compoſition it is inimitable.

We have dwelt thus long on the preſent ſubject, becauſe there is reaſon to apprehend, that the benefits ariſing from well-conducted ſatire have not been ſufficiently conſidered. A ſatire may often do more ſervice to the cauſe of religion and virtue, than a ſermon; ſince it gives pleaſure, at the ſame time that it creates fear or indignation, and conveys its ſentiments in a manner the moſt likely to captivate the mind.

> Of all the ways that wiſeſt men could find
> To mend the age and mortify mankind,
> Satire well writ has moſt ſucceſsful prov'd,
> And cures, becauſe the remedy is lov'd.
> Duke of *Bucks*'s Essay.

But to produce the deſired effect, it muſt be jocoſe, free, and impartial, though ſevere. The ſatiriſt ſhould always preſerve good-humour; and, however keen he cuts, ſhould cut with kindneſs. When he loſes temper, his weapons will be inverted, and the ridicule he threw at others will retort with contempt upon himſelf: for the reader will perceive that he is angry and hurt, and conſider his ſatire as the effect of malice, not of judgment; and that it is intended rather to wound perſons, than reform manners.

> Rage you muſt hide, and prejudice lay down:
> A ſatyr's ſmile is ſharper than his frown.

The beſt, and indeed the only method to expoſe vice and folly effectually, is to turn them to ridicule, and hold them up for public contempt; and as it moſt offends theſe objects of ſatire, ſo it leaſt hurts ourſelves. One paſſion frequently drives out another; and as we cannot look with indifference on the bad actions of men (for they muſt excite either our wrath or contempt), it is prudent to give way to that which moſt offends vice and folly, and leaſt affects ourſelves; and to ſneer and laugh, rather than be angry and ſcold.

95. Burleſque poetry, which is chiefly uſed by way of drollery and ridicule, falls properly to be ſpoken of under the head of ſatire. An excellent example of this kind is a poem in blank verſe, intitled *The Splendid Shilling*, written by Mr John Philips, which, in the opinion of one of the beſt judges of the age, is the fineſt burleſque in the Engliſh language. In this poem the author has handled a low ſubject in the lofty ſtyle and numbers of Milton; in which way of writing Mr Philips has been imitated by ſeveral, but none have come up to the humour and happy turn of the original. When we read it, we are betrayed into a pleaſure that we could not expect; though, at the ſame time, the ſublimity of the ſtyle, and gravity of the phraſe, ſeem to chaſtiſe that laughter which they provoke.

96. There is another ſort of verſe and ſtyle, which is moſt frequently made uſe of in treating any ſubject in a ludicrous manner, *viz.* that which is generally called *Hudibraſtic*, from Butler's admirable poem intitled *Hudibras*. Almoſt every one knows, that this poem is a ſatire upon the authors of our civil diſſentions in the reign of king Charles I. wherein the poet has, with abundance of wit and humour, expoſed and ridiculed the hypocriſy or blind zeal of thoſe unhappy times. In ſhort, it is a kind of burleſque epic poem, which, for the oddity of the rhymes, the quaintneſs of the ſimilies, the novelty of the thoughts, and that fine raillery which runs through the whole performance, is not to be parallelled.

Sect. X. *Of the Epigram.*

97. The *epigram is a little poem, or compoſition in verſe, treating of one thing only, and whoſe diſtinguiſhing characters are* brevity, beauty, and point.

The word *epigram* ſignifies "inſcription;" for epigrams derive their origin from thoſe inſcriptions placed by the ancients on their ſtatues, temples, pillars, triumphal arches, and the like; which, at firſt, were very ſhort, being ſometimes no more than a ſingle word; but afterwards, increaſing their length, they made them in verſe, to be the better retained by the memory. This ſhort way of writing came at laſt to be uſed upon any occaſion or ſubject; and hence the name of *epigram* has been given to any little copy of verſes, without regard to the original application of ſuch poems.

Its uſual limits are from 2 to 20 verſes, though ſometimes it extends to 50; but the ſhorter, the better it is, and the more perfect, as it partakes more of the nature and character of this kind of poem: beſides, the epigram, being only a ſingle thought, ought to be expreſſed in a little compaſs, or elſe it loſes its force and ſtrength.

The beauty required in an epigram is an harmony and apt agreement of all its parts, a ſweet ſimplicity, and polite language.

The point is a ſharp, lively, unexpected turn of wit, with which an epigram ought to be concluded. There are ſome critics, indeed, who will not admit the point in an epigram; but require that the thought be equally diffuſed through the whole poem, which is uſually the practice of Catullus, as the former is that of Martial. It is allowed there is more delicacy in the manner of Catullus; but the point is more agreeable to the general taſte, and ſeems to be the chief characteriſtic of the epigram.

This ſort of poem admits of all manner of ſubjects, provided that brevity, beauty, and point are preſerved; but it is generally employed either in praiſe or ſatire.

Though the beſt epigrams are ſaid to be ſuch as are compriſed in two or four verſes, we are not to underſtand it as if none can be perfect which exceed thoſe limits. Neither the ancients nor moderns have been ſo ſcrupulous with reſpect to the length of their epigrams; but however, brevity in general is always to be ſtudied in theſe compoſitions.

For examples of good epigrams in the Engliſh language, we ſhall make choice of ſeveral in the different taſtes we have mentioned; ſome remarkable for their delicate turn and ſimplicity of expreſſion; and others for their ſalt and ſharpneſs, their equivocating pun, or pleaſant alluſion. In the firſt place, take that of Mr Pope, ſaid to be written on a glaſs with the earl of Cheſterfield's diamond-pencil.

> Accept a miracle, inſtead of wit;
> See two dull lines by Stanhope's pencil writ.

The beauty of this epigram is more eaſily ſeen than deſcribed; and it is difficult to determine, whether it does more honour to the poet who wrote it, or to the nobleman for whom the compliment is deſigned.—The following epigram of Mr Prior is written in the ſame taſte, being a fine encomium on the peformance of an excellent painter.

On a Flower, painted by Varelst.

> When fam'd Varelſt this little wonder drew,
> Flora vouchſaf'd the growing work to view:

Finding the painter's ſcience at a ſtand,
The Goddeſs ſnatch'd the pencil from his hand,
And, finiſhing the piece, ſhe ſmiling ſaid,
Behold one work of mine which ne'er ſhall fade.

Another compliment of this delicate kind he has made Mr Howard in the following epigram.

VENUS *Miſtaken.*

When Chloe's picture was to Venus ſhown;
Surpriz'd, the Goddeſs took it for her own.
And what, ſaid ſhe, does this bold painter mean?
When was I bathing thus, and naked ſeen?
Pleas'd Cupid heard, and check'd his mother's pride:
And who's blind now, mamma? the urchin cry'd.
'Tis Chloe's eye, and cheek, and lip, and breaſt:
Friend Howard's genius fancy'd all the reſt.

Moſt of Mr Prior's epigrams are of this delicate caſt, and have the thought, like thoſe of Catallus, diffuſed through the whole. Of this kind is his addreſs

To CHLOE *Weeping.*

See, whilſt thou weep'ſt, fair Chloe, ſee
The world in ſympathy with thee.
The cheerful birds no longer ſing,
Each drops his head, and hangs his wing.
The clouds have bent their boſom lower,
And ſhed their ſorrow in a ſhow'r.
The brooks beyond their limits flow,
And louder murmurs ſpeak their wo:
The nymphs and ſwains adopt thy cares;
They heave thy ſighs, and weep thy tears.
Fantaſtic nymph! that grief ſhould move
Thy heart obdurate againſt love.
Strange tears! whoſe pow'r can ſoften all,
But that dear breaſt on which they fall.

The epigram written on the leaves of a fan by Dr Atterbury, late biſhop of Rocheſter, contains a pretty thought, expreſſed with eaſe and conciſeneſs, and cloſed in a beautiful manner.

On a FAN.

Flavia the leaſt and ſlighteſt toy
Can with reſiſtleſs art employ.
This fan in meaner hands would prove
An engine of ſmall force in love;
Yet ſhe, with graceful air and mien,
Not to be told or ſafely ſeen,
Directs its wanton motion ſo,
That it wounds more than Cupid's bow,
Gives coolneſs to the matchleſs dame,
To ev'ry other breaſt a flame.

We ſhall now ſelect ſome epigrams of the biting and ſatirical kind, and ſuch as turn upon the *pun* or *equivoque*, as the French call it: in which ſort the point is more conſpicuous than in thoſe of the former character.

The following diſtich is an admirable epigram, having all the neceſſary qualities of one, eſpecially point and brevity.

On a Company of bad DANCERS *to good Muſic.*

How ill the motion with the muſic ſuits!
So Orpheus fiddled, and ſo danc'd the brutes.

This brings to mind another epigram upon a bad fiddler, which we ſhall venture to inſert merely for the humour of it, and not for any real excellence it contains.

To a Bad FIDDLER.

Old Orpheus play'd ſo well, he mov'd Old Nick;
But thou mov'ſt nothing but thy fiddle-ſtick.

One of Martial's epigrams, wherein he agreeably rallies the fooliſh vanity of a man who hired people to make verſes for him, and publiſhed them as his own, has been thus tranſlated into Engliſh:

Paul ſo fond of the name of a poet is grown,
With gold he buys verſes, and calls them his own.
Go on, maſter Paul, nor mind what the world ſays,
They are ſurely his own for which a man pays.

Some bad writer having taken the liberty to cenſure Mr Prior, the poet very wittily laſhed his impertinence in this epigram:

While faſter than his coſtive brain indites,
Philo's quick hand in flowing letters writes,
His caſe appears to me like honeſt Teague's,
When he was run away with by his legs.
Phœbus, give Philo o'er himſelf command;
Quicken his ſenſes, or reſtrain his hand:
Let him be kept from paper, pen, and ink;
So he may ceaſe to write, and learn to think.

Mr Weſley has given us a pretty epigram, alluding to a well-known text of ſcripture, on the ſetting up a monument in Weſtminſter Abbey, to the memory of the ingenious Mr Butler, author of *Hudibras*.

While Butler, needy wretch, was yet alive,
No generous patron would a dinner give.
See him when ſtarv'd to death, and turn'd to duſt,
Preſented with a monumental buſt!
The poet's fate is here in emblem ſhown;
He aſk'd for *Bread*, and he receiv'd a *Stone*.

We ſhall cloſe this ſection with an epigram written on the well-known ſtory of Apollo and Daphne, by Mr Smart.

When Phœbus was am'rous and long'd to be rude,
Miſs Daphne cry'd Piſh! and ran ſwift to the wood;
And rather than do ſuch a naughty affair,
She became a fine laurel to deck the god's hair.
The nymph was, no doubt, of a cold conſtitution;
For, ſure, to turn tree was an odd reſolution!
Yet in this ſhe behav'd like a true modern ſpouſe,
For ſhe fled from his arms to diſtinguiſh his brows.

SECT. XI. *Of the Epitaph.*

102. THESE compoſitions generally contain ſome elogium of the virtues and good qualities of the deceaſed, and have a turn of ſeriouſneſs and gravity adapted to the nature of the ſubject. Their elegance conſiſts in a nervous and expreſſive brevity; and ſometimes they are cloſed with an epigrammatic point. In theſe compoſitions, no mere epithet (properly ſo called) ſhould be admitted; for here illuſtration would impair the ſtrength, and render the ſentiment too diffuſe and languid. Words that are ſynonymous are alſo to be rejected.

fear or indignation, and conveys its ſentiments in a manner the moſt likely to captivate the mind.

> Of all the ways that wiſeſt men could find
> To mend the age and mortify mankind,
> Satire well writ has moſt ſucceſsful prov'd,
> And cures, becauſe the remedy is lov'd.
> Duke of *Bucks*'s Essay.

But to produce the deſired effect, it muſt be jocoſe, free, and impartial, though ſevere. The ſatiriſt ſhould always preſerve good-humour; and, however keen he cuts, ſhould cut with kindneſs. When he loſes temper, his weapons will be inverted, and the ridicule he threw at others will retort with contempt upon himſelf: for the reader will perceive that he is angry and hurt, and conſider his ſatire as the effect of malice, not of judgment; and that it is intended rather to wound perſons, than reform manners.

> Rage you muſt hide, and prejudice lay down:
> A ſatyr's ſmile is ſharper than his frown.

The beſt, and indeed the only method to expoſe vice and folly effectually, is to turn them to ridicule, and hold them up for public contempt; and as it moſt offends theſe objects of ſatire, ſo it leaſt hurts ourſelves. One paſſion frequently drives out another; and as we cannot look with indifference on the bad actions of men (for they muſt excite either our wrath or contempt), it is prudent to give way to that which moſt offends vice and folly, and leaſt affects ourſelves; and to ſneer and laugh, rather than be angry and ſcold.

95. Burleſque poetry, which is chiefly uſed by way of drollery and ridicule, falls properly to be ſpoken of under the head of ſatire. An excellent example of this kind is a poem in blank verſe, intitled *The Splendid Shilling*, written by Mr John Philips, which, in the opinion of one of the beſt judges of the age, is the fineſt burleſque in the Engliſh language. In this poem the author has handled a low ſubject in the lofty ſtyle and numbers of Milton; in which way of writing Mr Philips has been imitated by ſeveral, but none have come up to the humour and happy turn of the original. When we read it, we are betrayed into a pleaſure that we could not expect; though, at the ſame time, the ſublimity of the ſtyle, and gravity of the phraſe, ſeem to chaſtiſe that laughter which they provoke.

96. There is another ſort of verſe and ſtyle, which is moſt frequently made uſe of in treating any ſubject in a ludicrous manner, *viz.* that which is generally called *Hudibraſtic*, from Butler's admirable poem intitled *Hudibras*. Almoſt every one knows, that this poem is a ſatire upon the authors of our civil diſſentions in the reign of king Charles I. wherein the poet has, with abundance of wit and humour, expoſed and ridiculed the hypocriſy or blind zeal of thoſe unhappy times. In ſhort, it is a kind of burleſque epic poem, which, for the oddity of the rhymes, the quaintneſs of the ſimilies, the novelty of the thoughts, and that fine raillery which runs through the whole performance, is not to be parallelled.

Sect. X. *Of the Epigram.*

97. The *epigram is a little poem, or compoſition in verſe, treating of one thing only, and whoſe diſtinguiſhing characters are* brevity, beauty, and point.

The word *epigram* ſignifies "inſcription;" for epigrams derive their origin from thoſe inſcriptions placed by the ancients on their ſtatues, temples, pillars, triumphal arches, and the like; which, at firſt, were very ſhort, being ſometimes no more than a ſingle word; but afterwards, increaſing their length, they made them in verſe, to be the better retained by the memory. This ſhort way of writing came at laſt to be uſed upon any occaſion or ſubject; and hence the name of *epigram* has been given to any little copy of verſes, without regard to the original application of ſuch poems.

Its uſual limits are from 2 to 20 verſes, though ſometimes it extends to 50; but the ſhorter, the better it is, and the more perfect, as it partakes more of the nature and character of this kind of poem: beſides, the epigram, being only a ſingle thought, ought to be expreſſed in a little compaſs, or elſe it loſes its force and ſtrength.

The beauty required in an epigram is an harmony and apt agreement of all its parts, a ſweet ſimplicity, and polite language.

The point is a ſharp, lively, unexpected turn of wit, with which an epigram ought to be concluded. There are ſome critics, indeed, who will not admit the point in an epigram; but require that the thought be equally diffuſed through the whole poem, which is uſually the practice of Catullus, as the former is that of Martial. It is allowed there is more delicacy in the manner of Catullus; but the point is more agreeable to the general taſte, and ſeems to be the chief characteriſtic of the epigram.

This ſort of poem admits of all manner of ſubjects, provided that brevity, beauty, and point are preſerved; but it is generally employed either in praiſe or ſatire.

Though the beſt epigrams are ſaid to be ſuch as are compriſed in two or four verſes, we are not to underſtand it as if none can be perfect which exceed thoſe limits. Neither the ancients nor moderns have been ſo ſcrupulous with reſpect to the length of their epigrams; but however, brevity in general is always to be ſtudied in theſe compoſitions.

For examples of good epigrams in the Engliſh language, we ſhall make choice of ſeveral in the different taſtes we have mentioned; ſome remarkable for their delicate turn and ſimplicity of expreſſion; and others for their ſalt and ſharpneſs, their equivocating pun, or pleaſant alluſion. In the firſt place, take that of Mr Pope, ſaid to be written on a glaſs with the earl of Cheſterfield's diamond-pencil.

> Accept a miracle, inſtead of wit;
> See two dull lines by Stanhope's pencil writ.

The beauty of this epigram is more eaſily ſeen than deſcribed; and it is difficult to determine, whether it does more honour to the poet who wrote it, or to the nobleman for whom the compliment is deſigned.—The following epigram of Mr Prior is written in the ſame taſte, being a fine encomium on the peformance of an excellent painter.

On a Flower, painted by Varelst.

> When fam'd Varelſt this little wonder drew,
> Flora vouchſaf'd the growing work to view:

Finding the painter's ſcience at a ſtand,
The Goddeſs ſnatch'd the pencil from his hand,
And, finiſhing the piece, ſhe ſmiling ſaid,
Behold one work of mine which ne'er ſhall fade.

Another compliment of this delicate kind he has made Mr Howard in the following epigram.

VENUS *Miſtaken.*

When Chloe's picture was to Venus ſhown;
Surpriz'd, the Goddeſs took it for her own.
And what, ſaid ſhe, does this bold painter mean?
When was I bathing thus, and naked ſeen?
Pleas'd Cupid heard, and check'd his mother's pride:
And who's blind now, mamma? the urchin cry'd.
'Tis Chloe's eye, and cheek, and lip, and breaſt:
Friend Howard's genius fancy'd all the reſt.

Moſt of Mr Prior's epigrams are of this delicate caſt, and have the thought, like thoſe of Catallus, diffuſed through the whole. Of this kind is his addreſs

To CHLOE *Weeping.*

See, whilſt thou weep'ſt, fair Chloe, ſee
The world in ſympathy with thee.
The cheerful birds no longer ſing,
Each drops his head, and hangs his wing.
The clouds have bent their boſom lower,
And ſhed their ſorrow in a ſhow'r.
The brooks beyond their limits flow,
And louder murmurs ſpeak their wo:
The nymphs and ſwains adopt thy cares;
They heave thy ſighs, and weep thy tears.
Fantaſtic nymph! that grief ſhould move
Thy heart obdurate againſt love.
Strange tears! whoſe pow'r can ſoften all,
But that dear breaſt on which they fall.

The epigram written on the leaves of a fan by Dr Atterbury, late biſhop of Rocheſter, contains a pretty thought, expreſſed with eaſe and conciſeneſs, and cloſed in a beautiful manner.

On a FAN.

Flavia the leaſt and ſlighteſt toy
Can with reſiſtleſs art employ.
This fan in meaner hands would prove
An engine of ſmall force in love:
Yet ſhe, with graceful air and mien,
Not to be told or ſafely ſeen,
Directs its wanton motion ſo,
That it wounds more than Cupid's bow,
Gives coolneſs to the matchleſs dame,
To ev'ry other breaſt a flame.

We ſhall now ſelect ſome epigrams of the biting and ſatirical kind, and ſuch as turn upon the *pun* or *equivoque*, as the French call it: in which ſort the point is more conſpicuous than in thoſe of the former character.

The following diſtich is an admirable epigram, having all the neceſſary qualities of one, eſpecially point and brevity.

On a Company of bad DANCERS *to good Muſic.*

How ill the motion with the muſic ſuits!
So Orpheus fiddled, and ſo danc'd the brutes.

This brings to mind another epigram upon a bad fiddler, which we ſhall venture to inſert merely for the humour of it, and not for any real excellence it contains.

To a Bad FIDDLER.

Old Orpheus play'd ſo well, he mov'd Old Nick;
But thou mov'ſt nothing but thy fiddle-ſtick.

One of Martial's epigrams, wherein he agreeably rallies the fooliſh vanity of a man who hired people to make verſes for him, and publiſhed them as his own, has been thus tranſlated into Engliſh:

Paul ſo fond of the name of a poet is grown,
With gold he buys verſes, and calls them his own.
Go on, maſter Paul, nor mind what the world ſays,
They are ſurely his own for which a man pays.

Some bad writer having taken the liberty to cenſure Mr Prior, the poet very wittily laſhed his impertinence in this epigram:

While faſter than his coſtive brain indites,
Philo's quick hand in flowing letters writes,
His caſe appears to me like honeſt Teague's,
When he was run away with by his legs.
Phœbus, give Philo o'er himſelf command;
Quicken his ſenſes, or reſtrain his hand:
Let him be kept from paper, pen, and ink;
So he may ceaſe to write, and learn to think.

Mr Weſley has given us a pretty epigram, alluding to a well-known text of ſcripture, on the ſetting up a monument in Weſtminſter Abbey, to the memory of the ingenious Mr Butler, author of *Hudibras.*

While Butler, needy wretch, was yet alive,
No generous patron would a dinner give.
See him when ſtarv'd to death, and turn'd to duſt,
Preſented with a monumental buſt!
The poet's fate is here in emblem ſhown;
He aſk'd for *Bread*, and he receiv'd a *Stone.*

We ſhall cloſe this ſection with an epigram written on the well-known ſtory of Apollo and Daphne, by Mr Smart.

When Phœbus was am'rous and long'd to be rude,
Miſs Daphne cry'd Piſh! and ran ſwift to the wood;
And rather than do ſuch a naughty affair,
She became a fine laurel to deck the god's hair.
The nymph was, no doubt, of a cold conſtitution;
For, ſure, to turn tree was an odd reſolution!
Yet in this ſhe behav'd like a true modern ſpouſe,
For ſhe fled from his arms to diſtinguiſh his brows.

SECT. XI. *Of the Epitaph.*

102. THESE compoſitions generally contain ſome elogium of the virtues and good qualities of the deceaſed, and have a turn of ſeriouſneſs and gravity adapted to the nature of the ſubject. Their elegance conſiſts in a nervous and expreſſive brevity; and ſometimes they are cloſed with an epigrammatic point. In theſe compoſitions, no mere epithet (properly ſo called) ſhould be admitted; for here illuſtration would impair the ſtrength, and render the ſentiment too diffuſe and languid. Words that are ſynonymous are alſo to be rejected.

Though the true characteriſtic of the epitaph is ſeriouſneſs and gravity, yet we may find many that are jocoſe and ludicrous: ſome likewiſe have true metre and rhyme; while others are between proſe and verſe, without any certain meaſure, though the words are truly poetical; and the beauty of this laſt ſort is generally heightened by an apt and judicious antitheſis. We ſhall give examples of each.

The following epitaph on Sir Philip Sidney's ſiſter, the counteſs of Pembroke, ſaid to be written by the famous Ben Johnſon, is remarkable for the noble thought with which it concludes.

On MARY *counteſs dowager of* PEMBROKE.

Underneath this noble marble hearſe,
Lies the ſubject of all verſe,
Sidney's ſiſter, Pembroke's mother:
Death, ere thou haſt kill'd another
Fair, and learn'd, and good as ſhe,
Time ſhall throw a dart at thee.

Take another epitaph of Ben Johnſon's, on a beautiful and virtuous lady, which has been deſervedly admired by very good judges.

Underneath this ſtone doth lie
As much virtue as could die;
Which when alive did vigour give
To as much beauty as could live.

Mr Pope has drawn the character of Mr Gay, in an epitaph now to be ſeen on his monument in Weſtminſter-abbey, which he has cloſed with a moſt beautiful turn, and is looked upon as a maſter-piece of its kind, as indeed are moſt of the productions of that ſurpriſing genius.

On Mr GAY.

Of manners gentle, of affections mild;
In wit, a man; ſimplicity, a child:
With native humour temp'ring virtuous rage,
Form'd to delight at once, and laſh the age:
Above temptation in a low eſtate,
And uncorrupted ev'n among the great:
A ſafe companion, and an eaſy friend,
Unblam'd thro' life, lamented in thy end.
Theſe are thy honours! not that here thy buſt
Is mix'd with heroes, or with kings thy duſt;
But that the worthy and the good ſhall ſay,
Striking their penſive boſoms—Here lies GAY.

Amongſt the epitaphs of a punning and ludicrous caſt, we know of none prettier than that which is ſaid to have been written by Mr Prior on himſelf, wherein he is pleaſantly ſatirical upon the folly of thoſe who value themſelves on account of the long ſeries of anceſtors through which they can trace their pedigree.

Nobles and heralds, by your leave,
  Here lies the bones of Matthew Prior,
The ſon of Adam and of Eve:
  Let Bourbon or Naſſau go higher.

The following epitaph on a miſer contains a good caution and an agreeable raillery.

Reader, beware immod'rate love of pelf:
Here lies the worſt of thieves, who robb'd himſelf.

But Dr Swift's epitaph on the ſame ſubject is a maſter-piece of the kind.

Beneath this verdant hillock lies
Demer, the wealthy and the wiſe.
His heirs, that he might ſafely reſt,
Have put his carcaſe in a cheſt:
The very cheſt, in which, they ſay,
His other Self, his money, lay.
And if his heirs continue kind
To that dear ſelf he left behind,
I dare believe that four in five
Will think his better half alive.

We ſhall give but one example more of this kind, which is a merry epitaph on an old fiddler, who was remarkable (we may ſuppoſe) for beating time to his own muſic.

On STEPHEN *the Fiddler.*

Stephen and time are now both even;
Stephen beat time, now time's beat Stephen.

We are come now to that ſort of epitaph which rejects rhyme, and has no certain and determinate meaſure; but where the diction muſt be pure and ſtrong, every word have weight, and the antitheſis be preſerved in a clear and direct oppoſition. We cannot give a better example of this ſort of epitaph, than that on the tomb of Mr Pultney in the cloiſters of Weſtminſter-abbey.

Reader,
If thou art a BRITON,
Behold this Tomb with Reverence and Regret:
Here lies the Remains of
DANIEL PULTENEY,
The kindeſt Relation, the trueſt Friend,
The warmeſt Patriot, the worthieſt Man.
He exerciſed Virtues in this Age,
Sufficient to have diſtinguiſh'd him even in the beſt.
Sagacious by Nature,
Induſtrious by Habit,
Inquiſitive with Art;
He gain'd a complete Knowledge of the State of Britain,
Foreign and domeſtic;
In moſt the backward Fruit of tedious Experience,
In him the early acquiſition of undiſſipated Youth.
He ſerv'd the Court ſeveral Years:
Abroad, in the auſpicious Reign of Queen Anne;
At home, in the reign of that excellent prince K. George I.
He ſerved his Country always,
At Court independent,
In the Senate unbiaſs'd,
At every Age, and in every Station:
This was the bent of his generous Soul,
This the buſineſs of his laborious Life.
Public Men, and Public Things,
He judged by one conſtant Standard,
The true Intereſt of Britain:
He made no other Diſtinction of Party,
He abhorred all other.
Gentle, humane, diſintereſted, beneficent,
He created no Enemies on his own Account:
Firm, determin'd, inflexible,
He feared none he could create in the Cauſe of Britain.

Reader,
In this Miſfortune of thy Country lament thy own:
For know,
The Loſs of ſo much private Virtue
Is a public Calamity.

That poignant ſatire, as well as extravagant praiſe, may be conveyed in this manner, will be ſeen by the following epitaph written by Dr Arbuthnot on Francis Chartres; which is too well known, and too much admired, to need our commendation.

HERE continueth to rot
The Body of FRANCIS CHARTRES,
Who with an INFLEXIBLE CONSTANCY,
And INIMITABLE UNIFORMITY of Life,
PERSISTED,
In ſpite of AGE and INFIRMITIES,
In the Practice of EVERY HUMAN VICE,
Excepting PRODIGALITY and HYPOCRISY:
His inſatiable AVARICE exempted him from the firſt,
His matchleſs IMPUDENCE from the ſecond.
Nor was he more ſingular
In the undeviating *Pravity* of his *Manners*,
Than ſucceſsful
In *Accumulating* WEALTH:
For, without TRADE or PROFESSION,
Without TRUST of PUBLIC MONEY,
And without BRIBE-WORTHY Service,
He acquired, or more properly created,
A MINISTERIAL ESTATE.
He was the only Perſon of his Time
Who could CHEAT without the Maſk of HONESTY,
Retain his Primæval MEANNESS
When poſſeſſed of TEN THOUSAND a-year;
And having daily deſerved the GIBBET for what he *did*,
Was at laſt condemn'd to it for what he *could* not *do*.
Oh indignant reader!
Think not his Life uſeleſs to Mankind;
PROVIDENCE conniv'd at his execrable deſigns,
To give to After-ages
A conſpicuous PROOF and EXAMPLE,
Of how ſmall Eſtimation is EXORBITANT WEALTH
In the Sight of GOD,
By His beſtowing it on the moſt UNWORTHY of ALL
MORTALS.

We ſhall conclude this ſpecies of poetry with a droll and ſatirical epitaph written by Mr Pope, which we tranſcribed from a monument in Lord Cobham's gardens at Stow in Buckinghamſhire.

To the Memory
of
SIGNIOR FIDO,
An *Italian* of good extraction;
Who came into *England*,
Not to bite us, like moſt of his Countrymen,
But to gain an honeſt Livelyhood.
He hunted not after Fame,
Yet acquir'd it;
Regardleſs of the Praiſe of his Friends,
but moſt ſenſible of their Love.
Tho' he liv'd among'ſt the Great,
He neither learnt nor flatter'd any Vice.
He was no Bigot,
Tho' he doubted of none of the 39 Articles.
And, if to follow Nature,
and to reſpect the Laws of Society,
be Philoſophy,
he was a perfect Philoſopher,
a faithful Friend,
an agreeable Companion,
a loving Huſband,
diſtinguiſh'd by a numerous offſpring,
all which he liv'd to ſee take good Courſes.
In his old Age he retired
to the houſe of a clergyman in the country,
where he finiſhed his earthly Race,
and died an Honour and an Example to the whole Species.
Reader,
This Stone is guiltleſs of Flattery;
for he to whom it is inſcrib'd
was not a MAN,
but a
GRE-HOUND.

PART III. ON VERSIFICATION.

ON this ſubject it is meant to confine our inquiry to Latin or Greek hexameters, and to French and Engliſh heroic verſe; as the obſervations we ſhall have occaſion to make, may, with proper variations, be eaſily transferred to the compoſition of other ſorts of verſe.

Before entering upon particulars, it muſt be premiſed in general, that to verſe of every kind, five things are of importance. 1ſt, The number of ſyllables that compoſe a line. 2d, The different lengths of ſyllables, *i. e.* the difference of time taken in pronouncing. 3d, The arrangement of theſe ſyllables combined in words. 4th, The pauſes or ſtops in pronouncing. 5th, Pronouncing ſyllables in a high or a low tone. The three firſt mentioned are obviouſly eſſential to verſe: if any of them be wanting, there cannot be that higher degree of melody which diſtinguiſheth verſe from proſe. To give a juſt notion of the fourth, it muſt be obſerved, that pauſes are neceſſary for three different purpoſes: one, to ſeparate periods, and members of the ſame period, according to the ſenſe: another, to improve the melody of verſe: and the laſt, to afford opportunity for drawing breath in reading. A pauſe of the firſt kind is variable, being long or ſhort, frequent or leſs frequent, as the ſenſe requires. A pauſe of the ſecond kind, being determined by the melody, is in no degree arbitrary. The laſt ſort is in a meaſure arbitrary, depending on the reader's command of breath. But as one cannot read with grace, unleſs, for drawing breath, opportunity be taken of a pauſe in the ſenſe or in the melody, this pauſe ought never to be diſtinguiſhed from the others; and for that reaſon ſhall be laid aſide. With reſpect then to the pauſes of ſenſe and of melody, it may be affirmed without heſitation, that their coincidence in verſe is a capital beauty: but as it cannot be expected, in a long work eſpecially, that every line ſhould be ſo perfect; we ſhall afterward have occaſion to ſee, that the pauſe neceſſary for the ſenſe muſt often, in ſome degree, be ſacrificed to the verſe-pauſe, and the latter ſometimes to the former.

The pronouncing ſyllables in a high or low tone, contributes alſo to melody. In reading, whether verſe or proſe, a certain tone is aſſumed, which may be called the *key-note;* and in that tone the bulk of the words are ſounded. Sometimes to humour the ſenſe, and ſometimes the melody, a particular ſyllable is ſounded in a higher tone; and this is termed *accenting a ſyllable*, or gracing it with an accent. Oppoſed to the accent, is the cadence, which, however, being entirely regulated by the ſenſe, hath no peculiar relation to verſe. The cadence is a falling of the voice below the key-note at the cloſe of every period; and ſo little is it eſſential to verſe, that in correct reading the final ſyllable of every line is accented, that ſyllable only excepted which cloſes the period where the ſenſe requires a cadence.

Though the five requiſites above mentioned enter the compoſition of every ſpecies of verſe, they are however governed by different rules, peculiar to each ſpecies. Upon quantity only, one general obſervation may be premiſed, becauſe it is applicable to every ſpecies of verſe, That ſyllables, with reſpect to the time taken in pronouncing, are long or ſhort; two ſhort ſyllables, with reſpect to time, being preciſely equal to a long one. Theſe two lengths are eſſential to verſe of all kinds; and to no verſe, it is believed, is a greater variety of time neceſſary in pronouncing ſyllables. The voice indeed is frequently made to reſt longer than uſual upon a word that bears an important ſignification; but this is done to humour the ſenſe, and is not neceſſary for melody. A thing not more neceſſary for melody occurs with reſpect to accenting, ſimilar to that now mentioned: A word ſignifying any thing humble, low, or dejected, is naturally, in proſe as well as in verſe, pronounced in a tone below the key-note.

We are now ſufficiently prepared for particulars; beginning with Latin or Greek hexameter, which are the ſame. The obſervations upon this ſpecies of verſe, will come under the four following heads, number, arrangement, pauſe, and accent; for as to quantity, what is obſerved above may ſuffice.

I. Hexameter lines, as to time, are all of the ſame length; being equivalent to the time taken in pronouncing twelve long ſyllables or twenty-four ſhort. An hexameter line may conſiſt of ſeventeen ſyllables: and when regular and not Spondaic, it never has fewer than thirteen: whence it follows, that where the ſyllables are many, the plurality muſt be ſhort; where few, the plurality muſt be long.

This line is ſuſceptible of much variety as to the ſucceſſion of long and ſhort ſyllables. It is however ſubjected to laws that confine its variety within certain limits: and for aſcertaining theſe limits, grammarians have invented a rule by dactyles and ſpondees, which they denominate *feet*. One at firſt view is led to think, that theſe feet are alſo intended to regulate the pronunciation: which is far from being the caſe; for were one to pronounce according to theſe feet, the melody of a hexameter line would be deſtroyed, or at beſt be much inferior to which it is when properly pronounced. Theſe feet muſt be confined to regulate the arrangement, for they ſerve no other purpoſe. They are withal extremely artificial and complex; for which reaſon we are obliged to lord Kames for ſubſtituting in their ſtead the following rules more ſimple and of more eaſy application. 1ſt, The line muſt always commence with a long ſyllable, and cloſe with two long preceded by two ſhort. 2d, More than two ſhort can never be found together, nor fewer than two. And, 3d, Two long ſyllables which have been preceded by two ſhort, cannot alſo be followed by two ſhort. Theſe few rules fulfil all the conditions of a hexameter line with relation to order or arrangement. To theſe again a ſingle rule may be ſubſtituted, which has alſo the advantage of regulating more affirmatively the conſtruction of every part. To put this rule into words with perſpicuity, a hint is taken from the twelve long ſyllables that compoſe an hexameter line, to divide it into twelve equal parts or portions, being each of them one long ſyllable or two ſhort. The rule then is: "The 1ſt, 3d, 5th, 7th, 9th, 11th, and 12th portions, muſt each of them be one long ſyllable; the 10th muſt always be two ſhort ſyllables; the 2d, 4th, 6th, and 8th, may either be one long or two ſhort." Or to expreſs the thing ſtill more curtly, "The 2d, 4th, 6th, and 8th portions may be one long ſyllable or two ſhort; the 10th muſt be two ſhort ſyllables; all the reſt muſt conſiſt each of one long ſyllable." This fulfils all the conditions of an hexameter line, and comprehends all the combinations of dactyles and ſpondees that this line admits.

Elem. of Criticiſm, ch. xviii. ſect. 4.

Next in order comes the pauſe. At the end of every hexameter line, every one muſt be ſenſible of a complete cloſe or full pauſe; the cauſe of which follows. The two long ſyllables preceded by two ſhort, which always cloſe an hexameter line, are a fine perparation for a pauſe: for long ſyllables, or ſyllables pronounced ſlow, reſembling a ſlow and languid motion tending to reſt, naturally incline the mind to reſt, or, which is the ſame, to pauſe; and to this inclination the two preceding ſhort ſyllables contribute, which, by contraſt, make the ſlow pronunciation of the final ſyllables the more conſpicuous. Beſide this complete cloſe or full pauſe at the end, others are alſo requiſite for the ſake of melody; of which, two are clearly diſcoverable; and perhaps there may be more. The longeſt and moſt remarkable, ſucceeds the 5th portion: the other, which, being ſhorter and more faint, may be called the *ſemipauſe*, ſucceeds the 8th portion. So ſtriking is the pauſe firſt mentioned, as to be diſtinguiſhed even by the rudeſt ear: the monkiſh rhymes are evidently built upon it; in which, by an invariable rule, the final word always chimes with that which immediately precedes the pauſe:

De planctu cudo || metrum cum carmine nudo
Mingere cum bumbis || res eſt ſaluberrima lumbis.

The difference of time in the pauſe and ſemipauſe, occaſions another difference not leſs remarkable; that it is lawful to divide a word by a ſemipauſe, but never by a pauſe, the bad effect of which is ſenſibly felt following examples:

Effuſus labor, at||que inmitis rupta Tyranni

Again:

Obſervans nido im||plumes detraxit; at illa

Again,
Loricam quam De||moleo detraxerat ipſe

The dividing a word by a ſemipauſe has not the ſame bad effect:

Jamque pedem referens || caſus e | vaſerat omnes.
Again:
Qualis populea || mœrens Philo|mela ſub umbra
Again:
Ludere que vellem || calamo per | miſit agreſti.

Lines, however, where words are left entire, without being divided even by a ſemipauſe, run by that means much the more ſweetly.

Nec gemere aërea || ceſſabit | turtur ab ulmo.
Again:
Quadrupedante putrem || ſonitu quatit | ungula campum.
Again:
Eurydicen toto || referebant | flumine ripæ.

The reaſon of theſe obſervations will be evident upon the ſlighteſt reflection. Between things ſo intimately connected in reading aloud, as are ſenſe and ſound, every degree of diſcord is unpleaſant: and for that reaſon, it is a matter of importance, to make the muſical pauſes coincide as much as poſſible with thoſe of ſenſe; which is requiſite, more eſpecially, with reſpect to the pauſe, a deviation from the rule being leſs remarkable in a ſemipauſe. Conſidering the matter as to melody ſolely, it is indifferent whether the pauſes be at the end of words or in the middle; but when we carry the ſenſe along, it is diſagreeable to find a word ſplit into two by a pauſe, as if there were really two words: and though the diſagreeableneſs here be connected with the ſenſe only, it is by an eaſy tranſition of perceptions transferred to the ſound; by which means we conceive a line to be harſh and grating to the ear, when in reality it is only ſo to the underſtanding.

To the rule that fixes the pauſe after the 5th portion, there is one exception, and no more. If the ſyllable ſucceeding the 5th portion be ſhort, the pauſe is ſometimes poſtponed to it:

Pupillis quos dura || premit cuſtodia matrum
Again:
In terras oppreſſa || gravi ſub religione
Again:
Et quorum pars magna || fui; quis talia fando

This contributes to diverſify the melody; and, where the words are ſmooth and liquid, is not ungraceful; as in the following examples:

Formoſam reſonare || doces Amaryllida ſylvas
Again:
Agricolas, quibus ipſa || procul diſcordibus armis

If this pauſe, placed as aforeſaid after the ſhort ſyllable, happen alſo to divide a word, the melody by theſe circumſtances is totally annihilated. Witneſs the following line of Ennius, which is plain proſe:

Romæ mœnia terru||it impiger | Hannibal armis.

Hitherto the arrangement of the long and ſhort ſyllables of an hexameter line and its different pauſes, have been conſidered with reſpect to melody: but to have a juſt notion of hexameter verſe, theſe particulars muſt alſo be conſidered with reſpect to ſenſe. There is not, perhaps, in any other ſort of verſe, ſuch latitude in the long and ſhort ſylables; a circumſtance that contributes greatly to that richneſs of melody which is remarkable in hexameter verſe, and which made Ariſtotle pronounce, that an epic poem in any other verſe would not ſucceed *. One defect, however, muſt not be diſſembled, that the ſame means which contribute to the richneſs of the melody, render it leſs fit than ſeveral other ſorts for a narrative poem. There cannot be a more artful contrivance, as above obſerved, than to cloſe an hexameter line with two long ſyllables preceded by two ſhort: but unhappily this conſtruction proves a great embarraſſment to the ſenſe; which will thus be evident. As, in general, there ought to be a ſtrict concordance between the thought and the words in which it is dreſſed; ſo, in particular, every cloſe in the ſenſe ought to be accompanied with a cloſe in the ſound. In proſe, this law may be ſtrictly obſerved; but in verſe, the ſame ſtrictneſs would occaſion inſuperable difficulties. Willing to ſacrifice to the melody of verſe, ſome ſhare of the concordance between thought and expreſſion, we freely excuſe the ſeparation of the muſical pauſe from that of the ſenſe, during the courſe of a line; but the cloſe of an hexameter line is too conſpicuous to admit this liberty: for which reaſon there ought always to be ſome pauſe in the ſenſe at the end of every hexameter line, were it but ſuch a pauſe as is marked by a comma; and for the ſame reaſon, there ought never to be a full cloſe in the ſenſe but at the end of a line, becauſe there the melody is cloſed. An hexameter line, to preſerve its melody, cannot well admit any greater relaxation; and yet, in a narrative poem, it is extremely difficult to adhere ſtrictly to the rule even with theſe indulgences. Virgil, the chief of poets for verſification, is forced often to end a line without any cloſe in the ſenſe, and as often to cloſe the ſenſe during the running of a line; though a cloſe in the melody during the movement of the thought, or a cloſe in the thought during the movement of the melody, cannot be agreeable.

The accent, to which we proceed, is not leſs eſſential than the other circumſtances above handled. By a good ear it will be diſcerned, that in every line there is one ſyllable diſtinguiſhable from the reſt by a capital accent: that ſyllable, being the ſeventh portion, is invariably long.

Nec bene promeritis || capitûr nec | tangitur ira
Again:
Non ſibi ſed toto || genitûm ſe | credere mundo
Again:
Qualis ſpelunca || ſubitò com | mota columba

In theſe examples, the accent is laid upon the laſt ſyllable of a word; which is favourable to the melody in the following reſpect, that the pauſe, which for the ſake of reading diſtinctly muſt follow every word, gives opportunity to prolong the accent. And for that reaſon, a line thus accented, has a more ſpirited air, than when the accent is placed on any other ſyllable. Compare the foregoing lines with the following.

Alba neque Aſſyrio || fucâtur | lana veneno
Again:
Panditur interea || domus ômnipo | tentis Olympi
Again:

---

* Poet. cap. 25.

Again:
Olli ſedato || reſpôndit | corde Latinus.

In lines where the pauſe comes after the ſhort ſyllable ſucceeding the fifth portion, the accent is diſplaced, and rendered leſs ſenſible: it ſeems to be ſplit into two, and to be laid partly on the fifth portion, and partly on the ſeventh its uſual place; as in

Nuda genu, nodôque || ſinûs col | lecta fluentes.
Again:
Formoſam reſonâre || docês Amar | yllida ſylvas.

Beſide this capital accent, ſlighter accents are laid upon other portions; particularly upon the fourth, unleſs where it conſiſts of two ſhort ſyllables; upon the ninth, which is always a long ſyllable; and upon the eleventh, where the line concludes with a monoſyllable. Such concluſion, by the by, impairs the melody, and for that reaſon is not to be indulged unleſs where it is expreſſive of the ſenſe. The following lines are marked with all the accents.

Ludere quæ vêllem calamô permiſit agreſti
Again:
Et duræ quêrcus ſudâbunt rôſcida mella
Again:
Parturiunt môntes, naſcêtur rîdiculûs mus.

Reflecting upon the melody of hexameter verſe, we find, that order or arrangement doth not conſtitute the whole of it: for when we compare different lines, equally regular as to the ſucceſſion of long and ſhort ſyllables, the melody is found in very different degrees of perfection; which is not occaſioned by any particular combination of dactyles and ſpondees, or of long and ſhort ſyllables, becauſe we find lines where dactyles prevail, and lines where ſpondees prevail, equally melodious. Of the former take the following inſtance:

Æneadum genitrix hominum divumque voluptas.

Of the latter:

Molli paulatim flaveſcet campus ariſta.

What can be more different as to melody than the two following lines, which, however, as to the ſucceſſion of long and ſhort ſyllables, are conſtructed preciſely in the ſame manner.

Spond. Dact. Spond. Spond. Dact. Spond.
Ad talos ſtola dimiſſa et circumdata palla. *Hor.*
Spond. Dact. Spond Spond. Dact. Spond.
Placatumque nitet diffuſo lumine cœlum. *Lucret.*

In the former, the pauſe falls in the middle of a word, which is a great blemiſh, and the accent is diſturbed by a harſh eliſion of the vowel *a* upon the particle *et*. In the latter, the pauſes and the accent are all of them diſtinct and full: there is no eliſion: and the words are more liquid and ſounding. In theſe particulars conſiſts the beauty of an hexameter line with reſpect to melody; and by neglecting theſe, many lines in the ſatires and epiſtles of Horace are leſs agreeable than plain proſe; for they are neither the one nor the other in perfection. To draw melody from theſe lines, they muſt be pronounced without relation to the ſenſe: it muſt not be regarded, that words are divided by pauſes, nor that harſh eliſions are multiplied. To add to the account, proſaic low-ſounding words are introduced; and, which is ſtill worſe, accents are laid on them. Of ſuch faulty lines take the following inſtances.

Candida rectaque ſit, munda hactenus ſit neque longa.
Jupiter exclamat ſimul atque audirit; at in ſe
Cuſtodes, lectica, ciniſlones, paraſitæ
Optimus eſt modulator, ut Alfenus Vafer omni
Nunc illud tantum quæram, meritone tibi ſit.

II. Next in order comes Engliſh heroic verſe; which ſhall be examined under the whole five heads, of number, quantity, arrangement, pauſe, and accent. This verſe is of two kinds; one named *rhyme* or *metre*, and one *blank verſe*. In the former, the lines are connected two and two by ſimilarity of ſound in the final ſyllables; and two lines ſo connected are termed a *couplet*: ſimilarity of ſound being avoided in the latter, couplets are baniſhed. Theſe two ſorts muſt be handled ſeparately, becauſe there are many peculiarities in each.

(1.) Beginning with rhyme or metre, the firſt article ſhall be diſcuſſed in a few words. Every line conſiſts of ten ſyllables, five ſhort and five long; from which there are but two exceptions, both of them rare. The firſt is, where each line of a couplet is made eleven ſyllables, by an additional ſhort ſyllable at the end:

There heros' wits are kept in pond'rous vaſes,
And beaus' in ſnuff-boxes and tweezer-caſes.
The piece, you think, is incorrect? Why, take it,
I'm all ſubmiſſion; what you'd have it, make it.

This licence is ſufferable in a ſingle couplet; but if frequent, would give diſguſt.

The other exception concerns the ſecond line of a couplet, which is ſometimes ſtretched out to 12 ſyllables, termed an *Alexandrine line*:

A needleſs Alexandrine ends the ſong, [along.
That, like a wounded ſnake, drags its ſlow length

It doth extremely well when employed to cloſe a period with a certain pomp and ſolemnity, where the ſubject makes that tone proper.

With regard to quantity, it is unneceſſary to mention a ſecond time, that the quantities employed in verſe are but two, the one double of the other; that every ſyllable is reducible to one or other of theſe ſtandards; and that a ſyllable of the larger quantity is termed *long*, and of the leſſer quantity *ſhort*. It belongs more to the preſent article, to examine what peculiarities there may be in the Engliſh language as to long and ſhort ſyllables. Every language has ſyllables that may be pronounced long or ſhort at pleaſure; but the Engliſh above all abounds in ſyllables of that kind. In words of three or more ſyllables, the quantity for the moſt part is invariable: the exceptions are more frequent in diſſyllables: but as to monoſyllables, they may, without many exceptions, be pronounced either long or ſhort; nor is the ear hurt by a liberty that is rendered familiar by cuſtom. This ſhows, that the melody of Engliſh verſe muſt depend leſs upon quantity than upon other circumſtances: in which it differs widely from Latin verſe, where every ſyllable, having

Verſification.

but one ſound, ſtrikes the ear uniformly with its accuſtomed impreſſion; and a reader muſt be delighted to find a number of ſuch ſyllables, diſpoſed ſo artfully as to be highly melodious. Syllables variable in quantity cannot poſſeſs this power: for though cuſtom may render familiar both a long and a ſhort pronunciation of the ſame word; yet the mind, wavering between the two ſounds, cannot be ſo much affected as where every ſyllable has one fixed ſound.

[103], 116. And with reſpect to arrangement, which may be brought within a narrow compaſs, the Engliſh heroic line is commonly iambic, the firſt ſyllable ſhort, the ſecond long, and ſo on alternately thro' the whole line. One exception there is, pretty frequent, of lines commencing with a trochæus, i. e. a long and a ſhort ſyllable: but this affects not the order of the following ſyllables, which go on alternately as uſual, one ſhort and one long. The following couplet affords an example of each kind.

> Sōme ĭn thĕ fīelds ŏf pūrĕſt æthĕr plāy,
> Ănd bāſk ănd whītĕn īn thĕ blāze ŏf dāy.

117. It is a great imperfection in Engliſh verſe, that it excludes the bulk of polyſyllables, which are the moſt ſounding words in our language; for very few of them have ſuch alternation of long and ſhort ſyllables as to correſpond to either of the arrangements mentioned. Engliſh verſe accordingly is almoſt totally reduced to diſſyllables and monoſyllables: *magnanimity* is a ſounding word totally excluded: *impetuoſity* is ſtill a finer word, by the reſemblance of the ſound and ſenſe; and yet a negative is put upon it, as well as upon numberleſs words of the ſame kind. Polyſyllables compoſed of ſyllables long and ſhort alternately, make a good figure in verſe; for example, *obſervance*, *opponent*, *oſtenſive*, *pindaric*, *productive*, *prolific*, and ſuch others of three ſyllables. *Imitation*, *imperfection*, *miſdemeanor*, *mitigation*, *moderation*, *obſervator*, *ornamental*, *regulator*, and others ſimilar of four ſyllables, beginning with two ſhort ſyllables, the third long, and the fourth ſhort, may find a place in a line commencing with a trochæus.

One would not imagine, without trial, how uncouth falſe quantity appears in verſe; not leſs than a provincial tone or idiom. The article *the* is one of the few monoſyllables that is invariably ſhort: obſerve how harſh it makes a line where it muſt be pronounced long:

> Thĭs nȳmph, tŏ thē dĕſtrūctiŏn ōf mănkīnd.

Again,

> Th' ădvēnt'rŏus bārŏn thē brĭght lōcks ădmīr'd.

Let it be pronounced ſhort, and it reduces the melody almoſt to nothing: better ſo, however, than falſe quantity. In the following examples we perceive the ſame defect.

> And old impertinence || expel by new
> With varying vanities || from ev'ry part
> Love in theſe labyrinths || his ſlaves detains
> New ſtratagems || the radiant lock to gain
> Her eyes half languiſhing || half drown'd in tears
> Roar'd for the handkerchief || that caus'd his pain
> Paſſions like elements || though born to fight.

Verſification.

118. The great variety of melody conſpicuous in Engliſh verſe, ariſes chiefly from the pauſes and accents; which are of greater importance than is commonly thought. The pauſe, which paves the way to the accent, offers itſelf firſt to our examination; and from a very ſhort trial, the following facts will be verified. 1ſt, A line admits but one capital pauſe. 2d, In different lines, we find this pauſe after the fourth ſyllable, after the fifth, after the ſixth, and after the ſeventh. Theſe four places of the pauſe lay a ſolid foundation for dividing Engliſh heroic lines into four kinds; and unleſs the reader attend to this diſtinction, he cannot have any juſt notion of the richneſs and variety of Engliſh verſification. Each kind or order hath a melody peculiar to itſelf, readily diſtinguiſhable by a good ear; the cauſe of which will be afterwards made evident. It muſt be obſerved, at the ſame time, that the pauſe cannot be made indifferently at any of the places mentioned: it is the ſenſe that regulates the pauſe, as will be ſeen afterward; and conſequently, it is the ſenſe that determines of what order every line muſt be: there can be but one capital muſical pauſe in a line; and that pauſe ought to coincide, if poſſible, with a pauſe in the ſenſe, in order that the ſound may accord with the ſenſe.

What is ſaid ſhall be illuſtrated by examples of each ſort or order. And firſt of the pauſe after the fourth ſyllable:

> Back thro' the paths || of pleaſing ſenſe I ran

Again,

> Profuſe of bliſs || and pregnant with delight

After the fifth;

> So when an angel || by divine command,
> With riſing tempeſts || ſhakes a guilty land.

After the ſixth:

> Speed the ſoft intercourſe || from ſoul to ſoul

Again,

> Then from his cloſing eyes || thy form ſhall part

After the ſeventh:

> And taught the doubtful battle || where to rage

Again,

> And in the ſmooth deſcription || murmur ſtill

119. Beſide the capital pauſe now mentioned, inferior pauſes will be diſcovered by a nice ear. Of theſe there are commonly two in each line: one before the capital pauſe, and one after it. The former comes invariably after the firſt long ſyllable, whether the line begin with a long ſyllable or a ſhort. The other in its variety imitates the capital pauſe: in ſome lines it comes after the ſixth ſyllable, in ſome after the ſeventh, and in ſome after the eighth. Of theſe ſemipauſes take the following examples.

1ſt and 8th:

> Led | through a ſad || variety | of wo.

1ſt and 7th :

Still | on that breaſt || enamour'd | let me lie

2d and 8th :

From ſtorms | a ſhelter || and from heat | a ſhade

2d and 6th :

Let wealth | let honour || wait | the wedded dame

2d and 7th :

Above | all pain || all paſſion | and all pride

Even from theſe few examples it appears, that the place of the laſt ſemipauſe, like that of the full pauſe, is directed in a good meaſure by the ſenſe. Its proper place with reſpect to the melody is after the eighth ſyllable, ſo as to finiſh the line with an iambus diſtinctly pronounced, which, by a long ſyllable after a ſhort, is a preparation for reſt : but ſometimes it comes after the ſixth, and ſometimes after the ſeventh ſyllable, in order to avoid a pauſe in the middle of a word, or between two words intimately connected; and ſo far melody is juſtly ſacrificed to ſenſe.

120. In diſcourſing of hexameter verſe, it was laid down as a rule, That a full pauſe ought never to divide a word : ſuch licence deviates too far from the coincidence that ought to be between the pauſes of ſenſe and of melody. The ſame rule muſt obtain in an Engliſh line ; and we ſhall ſupport reaſon by experiments :

A noble ſuper||fluity it craves
Abhor, a perpe||tuity ſhould ſtand

Theſe lines ſeem ſcarcely diſtinguiſhable from proſe.

The ſame rule is not applicable to a ſemipauſe, which, being ſhort and faint, is not ſenſily diſagreeable when it divides a word.

Relent | leſs walls || whoſe darkſome round | contains
For her | white virgins || hyme | neals ſing
In theſe | deep ſolitudes || and aw | ful cells

It muſt however be acknowledged, that the melody here ſuffers in ſome degree : a word ought to be pronounced without any reſt between its component ſyllables : a ſemipauſe that bends to this rule, is ſcarce perceived.

121. The capital pauſe is ſo eſſential to the melody, that one cannot be too nice in the choice of its place, in order to have it clear and diſtinct. It cannot be in better company than with a pauſe in the ſenſe ; and if the ſenſe require but a comma after the fourth, fifth, ſixth, or ſeventh ſyllable, it is ſufficient for the muſical pauſe. But to make ſuch coincidence eſſential, would cramp verſification too much ; and we have experience for our authority, that there may be a pauſe in the melody where the ſenſe requires none. We muſt not however imagine, that a muſical pauſe may come after any word indifferently : ſome words, like ſyllables of the ſame word, are ſo intimately connected, as not to bear a ſeparation even by a pauſe : the ſeparating, for example, a ſubſtantive from its article would be harſh and unpleaſant ; witneſs the following line, which cannot be pronounced with a pauſe as marked,

If Delia ſmile, the || flowr's begin to ſpring.

But ought to be pronounced in the following manner,

If Delia ſmile, || the flow'rs begin to ſpring.

If then it be not a matter of indifference where to make the pauſe, there ought to be rules for determining what words may be ſeparated by a pauſe, and what are incapable of ſuch ſeparation. We ſhall endeavour to aſcertain theſe rules ; not chiefly for their utility, but in order to unfold ſome latent principles, that tend to regulate our taſte even where we are ſcarce ſenſible of them : and to that end, the method that appears the moſt promiſing, is to run over the verbal relations, beginning with the moſt intimate. The firſt that preſents itſelf, is that of adjective and ſubſtantive, being the relation of ſubject and quality, the moſt intimate of all : and with reſpect to ſuch intimate companions, the queſtion is, Whether they can bear to be ſeparated by a pauſe. What occurs is, that a quality cannot exiſt independent of a ſubject ; nor are they ſeparable even in imagination, becauſe they make parts of the ſame idea : and for that reaſon, with reſpect to melody as well as ſenſe, it muſt be diſagreeable to beſtow upon the adjective a ſort of independent exiſtence, by interjecting a pauſe between it and its ſubſtantive ; as in the following examples.

Of thouſand bright || inhabitants of air
The ſprites of fiery || termagants inflame
The reſt, his many-colour'd || robe conceal'd
The ſame, his ancient || perſonage to deck
Ev'n here, where frozen || Chaſtity retires
I ſit, with ſad || civility, I read
Back to my native || moderation ſlide
Or ſhall we ev'ry || decency confound
Time was, a ſober || Engliſhman would knock
And place, on good || ſecurity, his gold
Taſte, that eternal || wanderer, which flies
But ere the tenth || revolving day was run
Firſt let the juſt || equivalent be paid
Go, threat thy earth-born || myrmidons ; but here.
Haſte to the fierce || Achilles' tent (he cries)
All but the ever-wakeful || eyes of Jove
Your own reſiſtleſs || eloquence employ

122. Conſidering this matter ſuperficially, one might be apt to imagine, that it muſt be the ſame, whether the adjective go firſt, which is the natural order, or the ſubſtantive, which is indulged by the laws of inverſion. But we ſoon diſcover this to be a miſtake : colour, for example, cannot be conceived independent of the ſurface coloured ; but a tree may be conceived, as growing in a certain ſpot, as of a certain kind, and as ſpreading its extended branches all around, without ever thinking of its colour. In a word, a ſubject may be conſidered with ſome of its qualities independent of others ; though we cannot form an image of any ſingle quality independent of the ſubject. Thus then, tho' an adjective named firſt be inſeparable from the ſubſtantive,

ſtantive, the propoſition does not reciprocate: an image can be formed of the ſubſtantive independent of the adjective; and for that reaſon, they may be ſeparated by a pauſe, when the ſubſtantive takes the lead.

For thee the fates ‖ ſeverely kind ordain
And curs'd with hearts ‖ unknowing how to yield

123. The verb and adverb are preciſely in the ſame condition with the ſubſtantive and adjective. An adverb, which modifies the action expreſſed by the verb, is not ſeparable from the verb even in imagination; and therefore the following lines ſeem faulty.

And which it much ‖ becomes you to forget
'Tis one thing madly ‖ to diſperſe my ſtore

But an action may be conceived with ſome of its modifications, leaving out others, preciſely as a ſubject may be conceived with ſome of its qualities, leaving out others; and therefore, when by inverſion the verb is firſt introduced, it has no bad effect to interject a pauſe between it and the adverb that follows: this may be done at the cloſe of a line, where the pauſe is at leaſt as full as that is which divides the line:

While yet he ſpoke, the Prince advancing drew
Nigh to the lodge, &c.

124. The agent and its action come next, expreſſed in grammar by the active ſubſtantive and its verb. Between theſe, placed in their natural order, there is no difficulty of interjecting a pauſe: an active being is not always in motion, and therefore it is eaſily ſeparable in idea from its action: when in a ſentence the ſubſtantive takes the lead, we know not that action is to follow; and as reſt muſt precede the commencement of motion, this interval is a proper opportunity for a pauſe.

Nor when by inverſion the verb is placed firſt, is it lawful to ſeparate it by a pauſe from the active ſubſtantive; becauſe an action is not in idea ſeparable from the agent, more than a quality from the ſubject to which it belongs.

125. The point of the greateſt delicacy regards the active verb and the paſſive ſubſtantive placed in their natural order. On the one hand, it will be obſerved, that theſe words ſignify things which are not ſeparable in idea: killing cannot be conceived without a being that is put to death, nor painting without a ſurface upon which the colours are ſpread. On the other hand, an action and the thing on which it is exerted are not, like ſubject and quality, united in one individual object: the active ſubſtantive is perfectly diſtinct from that which is paſſive; and they are connected by one circumſtance only, that the action exerted by the former is exerted upon the latter. This makes it poſſible to take the action to pieces, and to conſider it firſt with relation to the agent, and next with relation to the patient. But after all, ſo intimately connected are the parts of the thought, that it requires an effort to make a ſeparation even for a moment: the ſubtiliſing to ſuch a degree is not agreeable, eſpecially in works of imagination. The beſt poets, however, taking advantage of this ſubtilty, ſcruple not to ſeparate by a pauſe an active verb from the thing upon which it is exerted. Such pauſes in a long work may be indulged; but taken ſingly, they certainly are not agreeable:

The peer now ſpreads ‖ the glitt'ring forfex wide
As ever ſully'd ‖ the fair face of light
Repair'd to ſearch ‖ the gloomy cave of Spleen
Nothing, to make ‖ philoſophy thy friend
Shou'd chance to make ‖ the well-dreſs'd rabble ſtare
Or croſs, to plunder ‖ provinces, the main
Theſe madmen ever hurt ‖ the church or ſtate
How ſhall we fill ‖ a library with wit
What better teach ‖ a foreigner the tongue
Sure, if I ſpare ‖ the miniſter, no rules
Of honour bind me, not to maul his tools.

On the other hand, when the paſſive ſubſtantive is by inverſion firſt named, there is no difficulty of interjecting a pauſe between it and the verb, more than when the active ſubſtantive is firſt named. The ſame reaſon holds in both, that though a verb cannot be ſeparated in idea from the ſubſtantive which governs it, and ſcarcely from the ſubſtantive it governs; yet a ſubſtantive may always be conceived independent of the verb: when the paſſive ſubſtantive is introduced before the verb, we know not that an action is to be exerted upon it; therefore we may reſt till the action commences. For the ſake of illuſtration, take the following examples:

Shrines! where their vigils ‖ pale-ey'd virgins keep
Soon as thy letters ‖ trembling I uncloſe
No happier taſk ‖ theſe faded eyes purſue

What is ſaid about the pauſe, leads to a general obſervation, That the natural order of placing the active ſubſtantive and its verb, is more friendly to a pauſe than the inverted order; but that in all the other connections, inverſion affords a far better opportunity for a pauſe. And hence one great advantage of blank verſe over rhyme; its privilege of inverſion giving it a much greater choice of pauſes than can be had in the natural order of arrangement.

126. We now proceed to the ſlighter connections, which ſhall be diſcuſſed in one general article. Words connected by conjunctions and prepoſitions admit freely a pauſe between them, which will be clear from the following inſtances:

Aſſume what ſexes ‖ and what ſhape they pleaſe
The light militia ‖ of the lower ſky

Connecting particles were invented to unite in a period two ſubſtantives ſignifying things occaſionally united in the thought, but which have no natural union: and between two things not only ſeparable in idea, but really diſtinct, the mind, for the ſake of melody, cheerfully admits by a pauſe a momentary disjunction of their occaſional union.

127. One capital branch of the ſubject is ſtill upon hand. It concerns thoſe parts of ſpeech which ſingly repreſent

ſent no idea, and which become not ſignificant till they be joined to other words: theſe are, conjunctions, prepoſitions, articles, and ſuch like acceſſories, paſſing under the name of *particles*. Upon theſe the queſtion occurs, Whether they can be ſeparated by a pauſe from the words that make them ſignificant? whether, for example, in the following lines, the ſeparation of the acceſſory prepoſition from the principal ſubſtantive, be according to rule?

The goddeſs with || a diſcontented air
And heighten'd by || the diamond's circling rays
When victims at || yon altar's foot we lay
So take it in || the very words of Creech
An enſign of || the delegates of Jove
Two ages o'er || his native realm he reign'd
While angels, with || their ſilver wings o'erſhade

Or the ſeparation of the conjunction from the word that is connected by it with the antecedent word:

Talthybius and || Eurybates the good

It will be obvious at the firſt glance, that the foregoing reaſoning upon objects naturally connected, is not applicable to words which of themſelves are mere ciphers: we muſt therefore have recourſe to ſome other principle for ſolving the preſent queſtion. Theſe particles out of their place are totally inſignificant: to give them a meaning, they muſt be joined to certain words; and the neceſſity of this junction, together with cuſtom, forms an artificial connection that has a ſtrong influence upon the mind: it cannot bear even a momentary ſeparation, which deſtroys the ſenſe, and is at the ſame time contradictory to practice. Another circumſtance tends ſtill more to make this ſeparation diſagreeable in lines of the firſt and third order, that it bars the accent; which will be explained afterward in treating of the accent.

128. Hitherto we have diſcourſed upon that pauſe only which divides the line. We proceed to the pauſe that concludes the line; and the queſtion is, Whether the ſame rules be applicable to both? This muſt be anſwered by making a diſtinction. In the firſt line of a couplet, the concluding pauſe differs little, if at all, from the pauſe which divides the line; and for that reaſon, the rules are applicable to both equally. The concluding pauſe of the couplet is in a different condition: it reſembles greatly the concluding pauſe in an hexameter line: both of them indeed are ſo remarkable, that they never can be graceful, unleſs where they accompany a pauſe in the ſenſe. Hence it follows, that a couplet ought always to be finiſhed with ſome cloſe in the ſenſe; if not a point, at leaſt a comma. The truth is, that this rule is ſeldom tranſgreſſed: in Pope's works we find very few deviations from the rule: take the following inſtances:

Nothing is foreign: parts relate to whole;
One all-extending, all-preſerving ſoul
Connects each being ——

Another:

To draw freſh colours from the vernal flow'rs;
To ſteal from rainbows, ere they drop in ſhow'rs,
A brighter waſh ——

It may be added, with reſpect to pauſes in general, that ſuppoſing the connection to be ſo ſlender as to admit a pauſe, it follows not that a pauſe may in every ſuch caſe be admitted. There is one rule to which every other ought to bend, That the ſenſe muſt never be wounded or obſcured by the muſic; and upon that account the following lines ſeem exceptionable:

Ulyſſes, firſt || in public cares, ſhe found,

And,

Who riſing, high || th' imperial ſceptre rais'd.

With reſpect to inverſion, it appears, both from reaſon and experiments, that many words which cannot bear a ſeparation in their natural order, admit a pauſe when inverted. And it may be added, that when two words, or two members of a ſentence, in their natural order, can be ſeparated by a pauſe, ſuch ſeparation can never be amiſs in an inverted order. An inverted period, which deviates from the natural train of ideas, requires to be marked in ſome meaſure even by pauſes in the ſenſe, that the parts may be diſtinctly known. Take the following examples.

As with cold lips || I kiſs'd the ſacred veil
With other beauties || charm my partial eyes
Full in my view || ſet all the bright abode
With words like theſe || the troops Ulyſſes rul'd
Back to th' aſſembly roll || the thronging train
Not for their grief || the Grecian hoſt I blame

The ſame where the ſeparation is made at the cloſe of the firſt line of the couplet:

For ſpirits, freed from mortal laws, with eaſe,
Aſſume what ſexes and what ſhapes they pleaſe.

The pauſe is tolerable even at the cloſe of the couplet, for the reaſon juſt now ſuggeſted, that inverted members require ſome ſlight pauſe in the ſenſe:

'Twas where the plane-tree ſpreads its ſhades around:
The altars heav'd; and from the crumbling ground
A mighty dragon ſhot.

129. Thus a train of reaſoning hath inſenſibly led us to concluſions with regard to the muſical pauſes, very different from thoſe in the article *Beauty of* LANGUAGE (ſect. II.) concerning the ſeparating by a circumſtance words intimately connected. One would conjecture, that where-ever words are ſeparable by interjecting a circumſtance, they ſhould be equally ſeparable by interjecting a pauſe: but, upon a more narrow inſpection, the appearance of analogy vaniſheth. This will be evident from conſidering, that a pauſe in the ſenſe diſtinguiſhes the different members of a period from each other; whereas when two words of the ſame member are ſeparated by a circumſlance, all the three make ſtill but one member; and therefore that words may be ſeparated by an interjected circumſtance, though theſe words are not ſeparated by a pauſe in the ſenſe. This ſets the matter in a clear light; for, as obſerved above, a muſical pauſe is intimately connected with a pauſe in the ſenſe, and ought, as far as poſſible, to be governed by it: particularly a muſical pauſe ought never to

be placed where a pauſe is excluded by the ſenſe, as, for example, between the adjective and following ſubſtantive, which make parts of the ſame idea; and ſtill leſs between a particle and the word that makes it ſignificant.

Abſtracting at preſent from the peculiarity of melody ariſing from the different pauſes, it cannot fail to be obſerved in general, that they introduce into our verſe no ſlight degree of variety. A number of uniform lines having all the ſame pauſe, are extremely fatiguing, which is remarkable in the French verſification. This imperfection will be diſcerned by a fine ear even in the ſhorteſt ſucceſſion, and becomes intolerable in a long poem. Pope excels in the variety of his melody, which, if different kinds can be compared, is indeed not leſs perfect than that of Virgil.

130. From what is laſt ſaid, there ought to be one exception: Uniformity in the members of a thought, demands equal uniformity in the verbal members which expreſs that thought. When therefore reſembling objects or things are expreſſed in a plurality of verſe-lines, theſe lines in their ſtructure ought to be as uniform as poſſible, and the pauſes in particular ought all of them to have the ſame place. Take the following examples.

By foreign hands || thy dying eyes were cloſs'd,
By foreign hands || thy decent limbs compos'd,
By foreign hands || thy humble grave adorn'd.

Again:

Bright as the ſun || her eyes the gazers ſtrike;
And, like the ſun, || they ſhine on all alike.

Speaking of Nature, or the God of Nature:

Warms in the ſun || refreſhes in the breeze,
Glows in the ſtars || and bloſſoms in the trees,
Lives through all life || extends through all extent,
Spreads undivided || operates unſpent.

131. Pauſes will detain us longer than was expected; for the ſubject is not yet exhauſted. It is laid down above, that Engliſh heroic verſe admits no more but four capital pauſes; and that the capital pauſe of every line is determined by the ſenſe to be after the 4th, the 5th, the 6th, or 7th ſyllable. That this doctrine holds true ſo far as melody alone is concerned, will be teſtified by every good ear. At the ſame time it is to be admitted, that this rule may be varied where the ſenſe or expreſſion requires a variation, and that ſo far the melody may juſtly be ſacrificed. Examples accordingly are not unfrequent, in Milton eſpecially, of the capital pauſe being after the 1ſt, the 2d, or the 3d ſyllable. And that this licence may be taken, even gracefully, when it adds vigour to the expreſſion, will be clear from the following example. Pope, in his tranſlation of Homer, deſcribes a rock broken off from a mountain, and hurling to the plain, in the following words:

From ſteep to ſteep the rolling ruin bounds;
At every ſhock the crackling wood reſounds;
Still gath'ring force, it ſmokes; and urg'd amain,
Whirls, leaps, and thunders down, impetuous, to the
plain:
There ſtops || So Hector. Their whole force he prov'd,
Reſiſtleſs when he rag'd; and when he ſtopt, unmov'd.

In the penult line the proper place of the muſical pauſe is at the end of the 5th ſyllable; but it enlivens the expreſſion by its coincidence with that of the ſenſe at the end of the 2d ſyllable: the ſtopping ſhort before the uſual pauſe in the melody, aids the impreſſion that is made by the deſcription of the ſtone's ſtopping ſhort; and what is loſt to the melody by this artifice, is more than compenſated by the force that is added to the deſcription. Milton makes a happy uſe of this licence: witneſs the following examples from his Paradiſe Loſt.

————Thus with the year
Seaſons return, but not to me returns
Day || or the ſweet approach of even or morn.

Celeſtial voices to the midnight-air
Sole || or reſponſive each to others note.

And over them triumphant Death his dart
Shook || but delay'd to ſtrike.

————And wild uproar
Stood rul'd || ſtood vaſt infinitude confin'd.

————And hard'ning in his ſtrength
Glories || for never ſince created man
Met ſuch embodied force.

From his ſlack hand the garland wreath'd for Eve
Down drop'd || and all the faded roſes ſhed.

Of uneſſential night, receives him next,
Wide gaping || and with utter loſs of being,
Threatens him, &c.

————For now the thought
Both of loſt happineſs and laſting pain
Torments him || round he throws his baleful eyes, &c.

If we conſider the foregoing paſſages with reſpect to melody ſingly, the pauſes are undoubtedly out of their proper place; but being united with thoſe of the ſenſe, they enforce the expreſſion, and enliven it greatly; for, as has been more than once obſerved, the beauty of expreſſion is communicated to the ſound, which, by a natural deception, makes even the melody appear more perfect than if the muſical pauſes were regular.

132. To explain the rules of accenting, two general obſervations muſt be premiſed. The firſt is, That accents have a double effect: they contribute to the melody, by giving it air and ſpirit: they contribute no leſs to the ſenſe, by diſtinguiſhing important words from others. Theſe two effects can never be ſeparated, without impairing the concord that ought to ſubſiſt between the thought and the melody: an accent, for example, placed on a low word, has the effect to burleſque it, by giving it an unnatural elevation; and the injury thus done to the ſenſe does not reſt there, for it ſeems alſo to injure the melody. Let us only reflect what a ridiculous figure a particle muſt make with an accent or emphaſis put upon it, a particle that of itſelf has no meaning, and that ſerves only, like cement, to unite words ſignificant. The other general obſervation is, That a word of whatever number of ſyllables, is not accented upon more than one of

them. The reaſon is, that the object is ſet in its beſt light by a ſingle accent, ſo as to make more than one unneceſſary for the ſenſe: and if another be added, it muſt be for the ſound merely; which would be a tranſgreſſion of the foregoing rule, by ſeparating a muſical accent from that which is requiſite for the ſenſe.

133. Keeping in view the foregoing obſervations, the doctrine of accenting Engliſh heroic verſe is extremely ſimple. In the firſt place, accenting is confined to the long ſyllables; for a ſhort ſyllable is not capable of an accent. In the next place, as the melody is enriched in proportion to the number of accents, every word that has a long ſyllable may be accented; unleſs the ſenſe interpoſe, which rejects the accenting a word that makes no figure by its ſignification. According to this rule, a line may admit five accents; a caſe by no means rare.

134. But ſuppoſing every long ſyllable to be accented, there is, in every line, one accent that makes a greater figure than the reſt, being that which precedes the capital pauſe. It is diſtinguiſhed into two kinds; one that is immediately before the pauſe, and one that is divided from the pauſe by a ſhort ſyllable. The former belongs to lines of the firſt and third order: the latter to thoſe of the ſecond and fourth. Examples of the firſt kind:

> Smooth flow the wâves || the zephyrs gently play,
> Belinda ſmîl'd || and all the world was gay.
>
> He rais'd his azure wând || and thus began.

Examples of the other kind:

> There lays three gârters || half a pair of gloves,
> And all the trôphies || of his former loves.
>
> Our humble prôvince || is to tend the fair,
> Not a leſs plêaſing || though leſs glorious care.
>
> And hew triumphal ârches || to the ground.

135. It is a capital defect in the compoſition of verſe, to put a low word, incapable of an accent, in the place where this accent ſhould be: this bars the accent altogether; than which there ſeems no fault more ſubverſive of the melody, if it be not the barring a pauſe altogether. Neither does any ſingle circumſtance contribute more to the energy of verſe, than to put an important word where the accent ſhould be, a word that merits a peculiar emphaſis. To ſhow the bad effect of excluding the capital accent, the reader is referred to ſome inſtances given above, where particles are ſeparated by a pauſe from the capital words that make them ſignificant; and which particles ought, for the ſake of melody, to be accented, were they capable of an accent. Add to theſe the following inſtances from the Eſſay on Criticiſm.

> Of leaving what || is natural and fit
> *line* 448.
>
> Not yet purg'd off, || of ſpleen and ſour diſdain
> *l.* 528.
>
> No pardon vile || obſcenity ſhould find
> *l.* 531.
>
> When love was all || an eaſy monarch's care
> *l.* 537.
>
> For 'tis but half || a judge's taſk, to know
> *l.* 562
>
> 'Tis not enough, || taſte, judgment, learning, join
> *l.* 563.
>
> That only makes || ſuperior ſenſe belov'd
> *l.* 578.
>
> Whoſe right it is, || uncenſur'd, to be dull
> *l.* 590.
>
> 'Tis beſt ſometimes || your cenſure to reſtrain
> *l.* 597.

When this fault is at the end of a line that cloſes a couplet, it leaves not the leaſt trace of melody:

> But of this frame the bearings, and the ties,
> The ſtrong connections, nice dependencies.

In a line expreſſive of what is humble or dejected' it improves the reſemblance between the ſound and ſenſe to exclude the capital accent. This, to our taſte, is a beauty in the following lines.

> In thêſe deep ſôlitudes || and aŵful cells
> The pôor inhâbitant || behôlds in vain

136. To conclude this article, the accents are not, like the ſyllables, confined to a certain number: ſome lines have no fewer than five, and there are lines that admit not above one. This variety, as we have ſeen, depends entirely on the different powers of the component words: particles, even where they are long by poſition, cannot be accented; and polyſyllables, whatever ſpace they occupy, admit but one accent. Polyſyllables have another defect, that they generally exclude the full pauſe. It is ſhown above, that few polyſyllables can find place in the conſtruction of Engliſh verſe; and here are reaſons for excluding them, could they find place.

137. It was mentioned above †, that the four ſorts of lines which enter into Engliſh heroic verſe, have, each of them, a peculiar melody diſtinguiſhable by a good ear. This it is now propoſed to account for. But firſt, it is proper to warn the candid reader not to expect this peculiarity of modulation in every inſtance: for the thought and expreſſion have ſo great an influence, as often to make the pooreſt melody paſs for rich and ſpirited. It is neceſſary therefore, firſt, That the experiment be tried upon lines equal with reſpect to the thought and expreſſion; for otherwiſe one may eaſily be miſled in judging of the melody: and next, That theſe lines be regularly accented before the pauſe; for upon a matter abundantly refined in itſelf, it is wiſhed not to be embarraſſed with faulty and irregular lines.

† No 118.

Theſe preliminaries adjuſted, we begin with ſome general obſervations, that will ſave repeating the ſame thing over and over upon each particular caſe. And, firſt, an accent ſucceeded by a pauſe, as in lines of the firſt and third order, makes a much greater figure than where the voice goes on without a ſtop. The fact is ſo certain, that no perſon who has an ear can be at a loſs to diſtinguiſh that accent from others. Nor have we far to ſeek for the efficient cauſe: the elevation of an accenting tone produceth in the mind a ſimilar elevation,

vation, which continues during the pauſe (A): but where the pauſe is ſeparated from the accent by a ſhort ſyllable, as in lines of the ſecond and fourth order, the impreſſion made by the accent is more ſlight when there is no ſtop, and the elevation of the accent is gone in a moment by the falling of the voice in pronouncing the ſhort ſyllable that follows. The pauſe alſo is ſenſibly affected by the poſition of the accent: in lines of the firſt and third order, the cloſe conjunction of the accent and pauſe occaſions a ſudden ſtop without preparation, which rouſes the mind, and beſtows on the melody a ſpirited air: when, on the other hand, the pauſe is ſeparated from the accent by a ſhort ſyllable, which always happens in lines of the ſecond and fourth order, the pauſe is ſoft and gentle: for this ſhort unaccented ſyllable ſucceeding one that is accented, muſt of courſe be pronounced with a falling voice, which naturally prepares for a pauſe; and the mind falls gently from the accented ſyllable, and ſlides into reſt as it were inſenſibly. Further, the lines themſelves derive different powers from the poſition of the pauſe, which will thus appear. A pauſe after the fourth ſyllable divides the line into two unequal portions, of which the larger comes laſt: this circumſtance reſolving the line into an aſcending ſeries, makes an impreſſion in pronouncing like that of aſcending; and to this impreſſion contributes the redoubled effort in pronouncing the larger portion, which is laſt in order. The mind has a different feeling when the pauſe ſucceeds the fifth ſyllable, which divides the line into two equal parts: theſe parts, pronounced with equal effort, are agreeable by their uniformity. A line divided by a pauſe after the ſixth ſyllable, makes an impreſſion oppoſite to that firſt mentioned: being divided into two unequal portions, of which the ſhorter is laſt in order, it appears like a ſlow deſcending ſeries; and the ſecond portion being pronounced with leſs effort than the firſt, the diminiſhed effort prepares the mind for reſt. And this preparation for reſt is ſtill more ſenſibly felt where the pauſe is after the ſeventh ſyllable, as in lines of the fourth order.

138. To apply theſe obſervations is an eaſy taſk. A line of the firſt order is of all the moſt ſpirited and lively: the accent, being followed inſtantly by a pauſe, makes an illuſtrious figure: the elevated tone of the accent elevates the mind: the mind is ſupported in its elevation by the ſudden unprepared pauſe which rouſes and animates: and the line itſelf, repreſenting by its unequal diviſion an aſcending ſeries, carries the mind ſtill higher, making an impreſſion ſimilar to that of going upward. The ſecond order has a modulation ſenſibly ſweet, ſoft, and flowing: the accent is not ſo ſprightly as in the former, becauſe a ſhort ſyllable intervenes between it and the pauſe; its elevation, by the ſame means, vaniſheth inſtantaneouſly; the mind, by a falling voice, is gently prepared for a ſtop: and the pleaſure of uniformity from the diviſion of the line into two equal parts, is calm and ſweet. The third order has a modulation not ſo eaſily expreſſed in words: it in part reſembles the firſt order, by the livelineſs of an accent ſucceeded inſtantly by a full pauſe: but then the elevation occaſioned by this circumſtance, is balanced in ſome degree by the remitted effort in pronouncing the ſecond portion, which remitted effort has a tendency to reſt. Another circumſtance diſtinguiſheth it remarkably: its capital accent comes late, being placed on the ſixth ſyllable, and this circumſtance beſtows on it an air of gravity and ſolemnity. The laſt order reſembles the ſecond in the mildneſs of its accent, and ſoftneſs of its pauſe; it is ſtill more ſolemn than the third, by the lateneſs of its capital accent: it alſo poſſeſſes in a higher degree than the third, the tendency to reſt; and by that circumſtance is of all the beſt qualified for cloſing a period in the completeſt manner.

139. But theſe are not all the diſtinguiſhing characters of the different orders. Each order alſo is diſtinguiſhed by its final accent and pauſe: the unequal diviſion in the firſt order, makes an impreſſion of aſcending; and the mind at the cloſe is in the higheſt elevation, which naturally prompts it to put a ſtrong emphaſis upon the concluding ſyllable, whether by raiſing the voice to a ſharper tone, or by expreſſing the word in a fuller tone. This order accordingly is of all the leaſt proper for concluding a period, where a cadence is proper, and not an accent. The ſecond order, being deſtitute of the impreſſion of aſcent, cannot rival the firſt order in the elevation of its concluding accent, nor conſequently in the dignity of its concluding pauſe; for theſe have a mutual influence. This order, however, with reſpect to its cloſe, maintains a ſuperiority over the third and fourth orders: in theſe the cloſe is more humble, being brought down by the impreſſion of deſcent, and by the remitted effort in pronouncing; conſiderably in the third order, and ſtill more conſiderably in the laſt. According to this deſcription, the concluding accents and pauſes of the four orders being reduced to a ſcale, will form a deſcending ſeries probably in an arithmetical progreſſion.

140. After what is ſaid, it will ſcarce be thought refining too much to ſuggeſt, that the different orders are qualified for different purpoſes, and that a poet of genius will be naturally led to make a choice accordingly. The firſt order ſeems proper for a ſentiment that is bold, lively, or impetuous; the third order, for what is grave, ſolemn, or lofty; the ſecond, for what is tender, delicate, or melancholy, and in general for all the ſympathetic emotions; and the laſt for ſubjects of the ſame kind, when tempered with any degree of ſolemnity. It is not contended that any one order is fitted for no other taſk than that aſſigned it; for at that rate, no ſort of melody would be left for accompanying thoughts that have nothing peculiar in them. It is meant to ſuggeſt, that each of the orders is peculiarly adapted to certain ſubjects, and better qualified than the others for expreſſing them. The beſt way to judge is

---

(A) Hence the livelineſs of the French language as to ſound, above the Engliſh; the laſt ſyllable in the former being generally long and accented, the long ſyllable in the latter being generally as far back in the word as poſſible, and often without an accent. For this difference there appears no cauſe ſo probable as temperament and diſpoſition; the French being briſk and lively, the Engliſh ſedate and reſerved: and this, if it hold, is a pregnant inſtance of a reſemblance between the character of a people and that of their language.

is by experiment; and to avoid the imputation of a partial ſearch, the inſtances ſhall be confined to a ſingle poem, beginning with the firſt order.

On her white breaſt a ſparkling croſs ſhe wore,
Which Jews might kiſs, and infidels adore.
Her lively looks a ſprightly mind diſcloſe,
Quick as her eyes, and as unfix'd as thoſe:
Favours to none, to all ſhe ſmiles extends;
Oft ſhe rejects, but never once offends.
Bright as the ſun, her eyes the gazers ſtrike;
And, like the ſun, they ſhine on all alike.
Yet graceful eaſe, and ſweetneſs void of pride,
Might hide her faults, if belles had faults to hide;
If to her ſhare ſome female errors fall,
Look on her face, and you'll forget 'em all.
Rape of the Lock.

In accounting for the remarkable livelineſs of this paſſage, it will be acknowledged by every one who has an ear, that the melody muſt come in for a ſhare. The lines, all of them, are of the firſt order; a very unuſual circumſtance in the author of this poem, ſo eminent for variety in his verſification. Who can doubt, that he has been led by delicacy of taſte to employ the firſt order preferably to the others?

Second order.
Our humble province is to tend the fair,
Not a leſs pleaſing, though leſs glorious care;
To ſave the powder from too rude a gale,
Nor let th' impriſon'd eſſences exhale;
To draw freſh colours from the vernal flow'rs;
To ſteal from rainbows, ere they drop their ſhow'rs, &c.

Again:
Oh, thoughtleſs mortals! ever blind to fate,
Too ſoon dejected, and too ſoon elate.
Sudden, theſe honours ſhall be ſnatch'd away,
And curs'd for ever this victorious day.

Third order.
To fifty choſen ſylphs, of ſpecial note,
We truſt th' important charge, the petticoat.

Again:
Oh ſay what ſtranger cauſe, yet unexplor'd,
Could make a gentle belle reject a lord?

A plurality of lines of the fourth order, would not have a good effect in ſucceſſion; becauſe, by a remarkable tendency to reſt, their proper office is to cloſe a period. The reader, therefore, muſt be ſatisfied with inſtances where this order is mixed with others.

Not louder ſhrieks to pitying heav'n are caſt,
When huſbands, or when lapdogs, breathe their laſt.
Again:
Steel could the works of mortal pride confound,
And hew triumphal arches to the ground.
Again:
She ſees, and trembles at th' approaching ill,
Juſt in the jaws of ruin, and codille.
Again:
With earneſt eyes, and round unthinking face,
He firſt the ſnuff-box open'd, then the caſe.

And this ſuggeſts another experiment, which is, to ſet the different orders more directly in oppoſition, by giving examples where they are mixed in the ſame paſſage.

Firſt and ſecond orders.
Sol through white curtains ſhot a tim'rous ray,
And ope'd thoſe eyes that muſt eclipſe the day.

Again:
Not youthful kings in battle ſeiz'd alive,
Not ſcornful virgins who their charms ſurvive,
Not ardent lovers robb'd of all their bliſs,
Not ancient ladies when refus'd a kiſs,
Not tyrants fierce that unrepenting die,
Not Cynthia when her mantua's pin'd awry,
E'er felt ſuch rage, reſentment, and deſpair,
As thou, ſad virgin! for thy raviſh'd hair.

Firſt and third.
Think what an equipage thou haſt in air.
And view with ſcorn two pages and a chair.
Again:
What guards the purity of melting maids,
In courtly balls, and midnight-maſquerades,
Safe from the treach'rous friend, the daring ſpark,
The glance by day, the whiſper in the dark?
Again:
With tender billet-doux he lights the pyre,
And breathes three amr'ous ſighs to raiſe the fire;
Then proſtrate falls, and begs, with ardent eyes,
Soon to obtain, and long poſſeſs the prize.
Again:
Jove's thunder roars, heav'n trembles all around,
Blue Neptune ſtorms, the bellowing deeps reſound,
Earth ſhakes her nodding tow'rs, the ground gives way,
And the pale ghoſts ſtart at the flaſh of day!

Second and third.
Sunk in Thaleſtris' arms, the nymph he found,
Her eyes dejected, and her hair unbound.
Again:
On her heav'd boſom hung her drooping head,
Which with a ſigh ſhe rais'd; and thus ſhe ſaid.

141. Upon the whole, from what has been obſerved, we may with aſſurance pronounce, that great is the merit of Engliſh heroic verſe: for though uniformity prevails in the arrangement, in the equality of the lines, and in the reſemblance of the final ſounds; variety is ſtill more conſpicuous in the pauſes and in the accents, which are diverſified in a ſurpriſing manner. Of the beauty that reſults from a due mixture of uniformity and variety *, many inſtances have already occurred, but none more illuſtrious than Engliſh verſification: however rude it may be in the ſimplicity of its arrangement, it is highly melodious by its pauſes and accents, ſo as already to rival the moſt perfect ſpecies known in Greece or Rome; and it is no diſagreeable proſpect to find it ſuſceptible of ſtill greater refinement.

142. (2.) We proceed to blank verſe, which hath ſo many circumſtances in common with rhyme, that its peculiarities may be brought within a narrow compaſs. With reſpect to form, it differs from rhyme in rejecting the jingle of ſimilar ſounds, which purifies it from a childiſh pleaſure. But this improvement is a

* See the article UNIFORMITY and *Variety*.

trifle compared with what follows. Our verſe is extremely cramped by rhyme; and the great advantage of blank verſe is, that it is at liberty to attend the imagination in its boldeſt flights, Rhyme neceſſarily divides verſe into couplets: each couplet makes a complete muſical period, the parts of which are divided by pauſes, and the whole ſummed up by a full cloſe at the end: the melody begins anew with the next couplet: and in this manner a compoſition in rhyme proceeds couplet after couplet. We have frequently had occaſion to mention the correſpondence and concord that ought to ſubſiſt between ſound and ſenſe; from which it is a plain inference, that if a couplet be a complete period with regard to melody, it ought regularly to be the ſame with regard to ſenſe. As it is extremely difficult to ſupport ſuch ſtrictneſs of compoſition, licences are indulged, as explained above; which, however, muſt be uſed with diſcretion, ſo as to preſerve ſome degree of concord between the ſenſe and the muſic: There ought never to be a full cloſe in the ſenſe but at the end of a couplet; and there ought always to be ſome pauſe in the ſenſe at the end of every couplet: the ſame period as to ſenſe may be extended through ſeveral couplets; but each couplet ought to contain a diſtinct member, diſtinguiſhed by a pauſe in the ſenſe as well as in the ſound; and the whole ought to be cloſed with a complete cadence. Rules ſuch as theſe muſt confine rhyme within very narrow bounds; a thought of any extent cannot be reduced within its compaſs; the ſenſe muſt be curtailed and broken into parts, to make it ſquare with the curtneſs of the melody; and beſide, ſhort periods afford no latitude for inverſion.

143. We have examined this point with the greater accuracy, in order to give a juſt notion of blank verſe; and to ſhow, that a ſlight difference in form may produce a very great difference in ſubſtance. Blank verſe has the ſame pauſes and accents with rhyme, and a pauſe at the end of every line, like what concludes the firſt line of a couplet. In a word, the rules of melody in blank verſe, are the ſame that obtain with reſpect to the firſt line of a couplet; but being diſengaged from rhyme, or from couplets, there is acceſs to make every line run into another, preciſely as to make the firſt line of a couplet run into the ſecond. There muſt be a muſical pauſe at the end of every line; but this pauſe is ſo ſlight as not to require a pauſe in the ſenſe: and accordingly the ſenſe may be carried on with or without pauſes, till a period of the utmoſt extent be completed by a full cloſe both in the ſenſe and the ſound: there is no reſtraint, other than that this full cloſe be at the end of a line; and this reſtraint is neceſſary, in order to preſerve a coincidence between ſenſe and ſound, which ought to be aimed at in general, and is indiſpenſable in the caſe of a full cloſe, becauſe it has a ſtriking effect. Hence the fitneſs of blank verſe for inverſion: and conſequently the luſtre of its pauſes and accents; for which, as obſerved in the article lately referred to, there is greater ſcope in inverſion, than when words run in their natural order.

144. Nothing contributes more than inverſion to the force and elevation of language: the couplets of rhyme confine inverſion within narrow limits; nor would the elevation of inverſion, were there acceſs for it in rhyme, readily accord with the humbler tone of that ſort of verſe. It is univerſally agreed, that the loftineſs of Milton's ſtyle ſupports admirably the ſublimity of his ſubject; and it is not leſs certain, that the loftineſs of his ſtyle ariſes chiefly from inverſion. Shakeſpeare deals little in inverſion; but his blank verſe being a ſort of meaſured proſe, is perfectly well adapted to the ſtage, where laboured inverſion is highly improper, becauſe in dialogue it never can be natural.

145. Hitherto we have conſidered that ſuperior power of expreſſion which verſe acquires by laying aſide rhyme. But this is not the only ground for preferring blank verſe: it has another preferable quality not leſs ſignal; and that is, a more extenſive and more complete melody. Its muſic is not, like that of rhyme, confined to a ſingle couplet, but takes in a great compaſs, ſo as in ſome meaſure to rival muſic properly ſo called. The interval between its cadences may be long or ſhort at pleaſure; and by that means its melody, with reſpect both to richneſs and variety, is ſuperior far to that of rhyme, and ſuperior even to that of the Greek and Latin hexameter. Of this obſervation no perſon can doubt who is acquainted with the Paradiſe Loſt: in which work there are indeed many careleſs lines; but at every turn the richeſt melody as well as the ſublimeſt ſentiments are conſpicuous. Take the following ſpecimen.

> Now Morn, her roſy ſteps in th' eaſtern clime
> Advancing, ſow'd the earth with orient pearl;
> When Adam wak'd, ſo cuſtom'd, for his ſleep
> Was aëry light from pure digeſtion bred,
> And temp'rate vapours bland, which th' only ſound
> Of leaves and fuming rills, Aurora's fan,
> Lightly diſpers'd, and the ſhrill matin ſong
> Of birds on ev'ry bough; ſo much the more
> His wonder was to find unwaken'd Eve
> With treſſes diſcompos'd, and glowing cheek,
> As through unquiet reſt: he on his ſide
> Leaning half-rais'd, with looks of cordial love
> Hung over her enamour'd, and beheld
> Beauty, which, whether waking or aſleep,
> Shot forth peculiar graces; then with voice
> Mild, as when Zephyrus on Flora breathes,
> Her hand ſoft touching, whiſper'd thus. Awake,
> My faireſt, my eſpous'd, my lateſt found,
> Heav'n's laſt beſt gift, my ever-new delight,
> Awake; the morning ſhines, and the freſh field
> Calls us; we loſe the prime, to mark how ſpring
> Our tended plants, how blows the citron grove,
> What drops the myrrh, and what the balmy reed,
> How nature paints her colours, how the bee
> Sits on the bloom extracting liquid ſweet.
>
> *Book* 5. *l.* 1.

146. Comparing Latin Hexameter with Engliſh heroic rhyme, the former has obviouſly the advantage in the following particulars. It is greatly preferable as to arrangement, by the latitude it admits in placing the long and ſhort ſyllables. Secondly, the length of an hexameter line hath a majeſtic air: ours, by its ſhortneſs, is indeed more briſk and lively, but much leſs fitted for the ſublime. And, thirdly, the long high-

ſounding words that hexameter admits, add greatly to its majeſty. To compenſate theſe advantages, Engliſh rhyme poſſeſſes a greater number and greater variety both of pauſes and of accents. Theſe two ſorts of verſe ſtand indeed pretty much in oppoſition: in hexameter, great variety of arrangement, none in the pauſes nor accents:- in Engliſh rhyme, great variety in the pauſes and accents, very little in the arrangement.

147. In blank verſe are united, in a good meaſure, the ſeveral properties of Latin hexameter and Engliſh rhyme; and it poſſeſſes beſide many ſignal properties of its own. It is not confined, like hexameter, by a full cloſe at the end of every line; nor, like rhyme, by a full cloſe at the end of every couplet. Its conſtruction, which admits the lines to run into each other, gives it a ſtill greater majeſty than ariſes from the length of a hexameter line. By the ſame means, it admits inverſion even beyond the Latin or Greek hexameter; for theſe ſuffer ſome confinement by the regular cloſes at the end of every line. In its muſic it is illuſtrious above all: the melody of hexameter verſe, is circumſcribed to a line; and of Engliſh rhyme, to a couplet: the melody of blank verſe is under no confinement, but enjoys the utmoſt privilege of which melody of verſe is ſuſceptible; which is, to run hand in hand with the ſenſe. In a word, blank verſe is ſuperior to hexameter in many articles; and inferior to it in none, ſave in the freedom of arrangement, and in the uſe of long words.

148. In French heroic verſe, there are found, on the contrary, all the defects of Latin hexameter and Engliſh rhyme, without the beauties of either: ſubjected to the bondage of rhyme, and to the full cloſe at the end of every couplet, it is alſo extremely fatiguing by uniformity in its pauſes and accents: the line invariably is divided by the pauſe into two equal parts, and the accent is invariably placed before the pauſe:

> Jeune et vaillant herôs || dont la haute ſageſſe
> N'eſt point la fruit tardif || d'une lente vieilleſſe.

Here every circumſtance contributes to a tireſome uniformity: a conſtant return of the ſame pauſe and of the ſame accent, as well as an equal diviſion of every line; which fatigue the ear without intermiſſion or change. This matter cannot be ſet in a better light, than by preſenting to the reader a French tranſlation of the following paſſage of Milton:

> Two of far nobler ſhape, erect and tall,
> Godlike erect, with native honour clad,
> In naked majeſty, ſeem'd lords of all:
> And worthy ſeem'd; for in their looks divine
> The image of their glorious Maker ſhone,
> Truth, wiſdom, ſanctitude ſevere and pure;
> Severe, but in true filial freedom plac'd;
> Whence true authority in men: though both
> Not equal, as their ſex not equal ſeem'd;
> For contemplation he and valour form'd,
> For ſoftneſs ſhe and ſweet attractive grace;
> He for God only, ſhe for God in him.

Were the pauſes of the ſenſe and ſound in this paſſage but a little better aſſorted, nothing in verſe could be more melodious. In general, the great defect of Milton's verſification, in other reſpects admirable, is the want of coincidence between the pauſes of the ſenſe and ſound.

The tranſlation is in the following words:

> Ce lieux délicieux, ce paradis charmant,
> Reçoit deux objets ſon plus bel ornement;
> Leur port majeſteux, et leur démarche altiere,
> Semble leur meriter ſur la nature entiere,
> Ce droit de commander que Dieu leur a donné,
> Sur leur auguſte front de gloire couronné.
> Du Souverain du ciel drille la reſemblance:
> Dans leur ſimples regards éclatte l'innocence,
> L' adorable candeur, l' aimable vérité,
> La raiſon, la ſageſſe, et la ſévérité,
> Qu' adoucit la prudence, et cet air de droiture
> Du viſage des rois reſpectable parure.
> Ces deux objets divins n' ont pas les mêmes traits,
> Ils paroiſſent formées, quoique toux deux parfaits;
> L'un pour la majeſté, la force, et la nobleſſe;
> L' autre pour la douceur, la grace, et la tendreſſe;
> Celui-ci pour Dieu ſeul, l'autre pour l'homme encor.

Here the ſenſe is fairly tranſlated, the words are of equal power, and yet how inferior the melody!

149. The preſent article ſhall be concluded with

A Liſt of the different Feet, *and of their* Names.

1. **Pyrrhichius**, conſiſts of two ſhort ſyllables. Examples: *Deus, given, cannot, hillock, running.*

2. **Spondeus**, conſiſts of two long ſyllables: *omnes, poſſeſs, forewarn, mankind, ſometime.*

3. **Iambus**, compoſed of a ſhort and a long: *pios, intent, degree, appear, conſent, repent, demand, report, ſuſpect, affront, event.*

4. **Trochæus**, or **Choreus**, a long and a ſhort: *ſervat, whereby, after, legal, meaſure, burden, holy, lofty.*

5. **Tribrachys**, three ſhort: *melius, property.*

6. **Molossus**, three long: *delectant.*

7. **Anapæstus**, two ſhort and a long: *animos, condeſcend, apprehend, overheard, acquieſce, immature, overcharge, ſerenade, opportune.*

8. **Dactylus**, a long and two ſhort: *carmina, evident, excellence, eſtimate, wonderful, altitude, burdened, miniſter, tenement.*

9. **Bacchius**, a ſhort and two long: *dolores.*

10. **Hyppobacchius**, or **Antibacchius**, two long and a ſhort: *pelluntur.*

11. **Creticus**, or **Amphimacer**, a ſhort ſyllable between two long: *inſito, afternoon.*

12. **Amphibrachys**, a long ſyllable between two ſhort: *honore, conſider, imprudent, procedure, attended, propoſed, reſpondent, concurrence, apprentice, reſpective, revenue.*

13. **Proceleusmaticus**, four ſhort ſyllables: *hominibus, neceſſary.*

14. **Dispondeus**, four long ſyllables: *infinitus*.

15. **Diiambus**, compoſed of two iambi: *ſeveritas*.

16. **Ditrochæus**, of two trochæi: *permanere*, *procurator*.

17. **Ionicus**, two ſhort ſyllables and two long: *properabant*.

18. Another foot paſſes under the ſame name, compoſed of two long ſyllables and two ſhort: *calcaribus*, *poſſeſſory*.

19. **Choriambus**, two ſhort ſyllables between two long: *nobilitas*.

20. **Antispastus**, two long ſyllables between two ſhort: *Alexander*.

21. **Pæon** 1ſt, one long ſyllable and three ſhort: *temporibus*, *ordinary*, *inventory*, *temperament*.

22. **Pæon** 2d, the ſecond ſyllable long, and the other three ſhort: *rapidity*, *ſolemnity*, *minority*, *conſidered*, *imprudently*, *extravagant*, *reſpectfully*, *accordingly*.

23. **Pæon** 3d, the third ſyllable long and the other three ſhort: *animatus*, *independent*, *condeſcendence*, *ſacerdotal*, *reimburſement*, *manufacture*.

24. **Pæon** 4th, the laſt ſyllable long and the other three ſhort: *celeritas*.

25. **Epitritus** 1ſt, the firſt ſyllable ſhort and the other three long: *voluptates*.

26. **Epitritus** 2d, the ſecond ſyllable ſhort and the other three long: *pœnitentes*.

27. **Epitritus** 3d, the third ſyllable ſhort and the other three long: *diſcordias*.

28. **Epitritus** 4th, the laſt ſyllable ſhort and the other three long: *fortunatus*.

29. A word of five ſyllables compoſed of a pyrrhichius and dactylus: *miniſterial*.

30. A word of five ſyllables compoſed of a trochæus and dactylus: *ſingularity*.

31. A word of five ſyllables compoſed of a dactylus and trochæus: *precipitation*, *examination*.

32. A word of five ſyllables, the ſecond only long: *ſignificancy*.

33. A word of ſix ſyllables compoſed of two dactyles: *impetuoſity*.

34. A word of ſix ſyllables compoſed of a tribrachys and dactyle: *puſillanimity*.

END OF THE EIGHTH VOLUME.

Directions for placing the Plates in this Volume.

Number of Plates.			
230, or Plate	CCXIII.	To face	Page 5563
231	CCXIV.	-	5567†
232	CCXV.	-	5571‡
233	CCXVI.	-	5584
234	CCXVII.	-	
235	CCXVIII.	-	
236	CCXIX.	-	5586
237	CCXX.	-	5598
238	CCXXI.	-	5590
239	CCXXII.	-	5592
240	CCXXIII.	-	5598
241	CCXXIV.	-	5601
242	CCXXV	-	5603
243	CCXXVI.	-	5607
244	CCXXVII.	-	5608
245	CCXXVIII.	-	5618
246, or Plate	CCXXIX.	To face	Page 5632
247	CCXXX.	-	5747
248	CCXXXI.	-	5755
249	CCXXXII.	-	5746
250	CCXXXIII.	-	5856
251	CCXXXIV.	-	5932
252	CCXXXV.	-	6136
253	CCXXXVI.	-	5974
254	CCXXXVII.	-	5978
255	CCXXXVIII.	-	5979
256	CCXXXIX.	-	6204
257	CCXL.	-	6206
258	CCXLI.	-	
259	CCXLII.	-	
260	CCXLIII.	-	6256

† Or the 1ſt page of Sig. M.
‡ Or the 5th page of Sig. M.

The binder will attend to this direction, as pages 5567 to 5574 have by miſtake been twice numbered in the printing.

3 MA 53

N. B. Errata, Omissions, &c. noticed and ſupplied in the APPENDIX at the end of the Work.